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# Gas Journal
THE MAGAZINE OF GAS DISTRIBUTION

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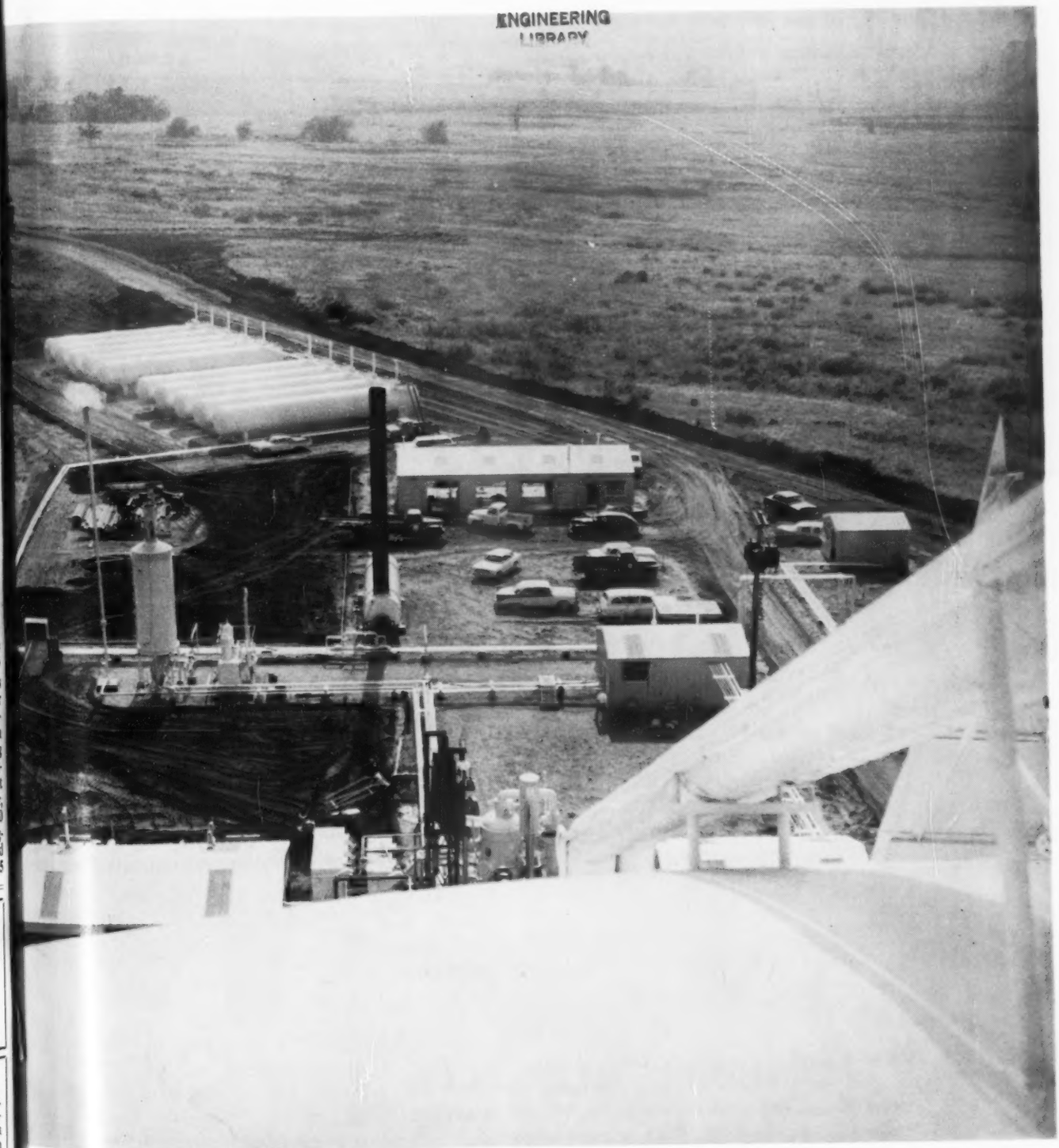

VIEW FROM THE TOP: MINNEGASCO'S DAKOTA STATION

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These Reynolds 8200 Series Regulators control gas flow with the same steady precision wherever they're used . . . at homes, on farm taps, small industrial installations, and on gas distribution systems. They're perfect as high and low pressure pilots, too.

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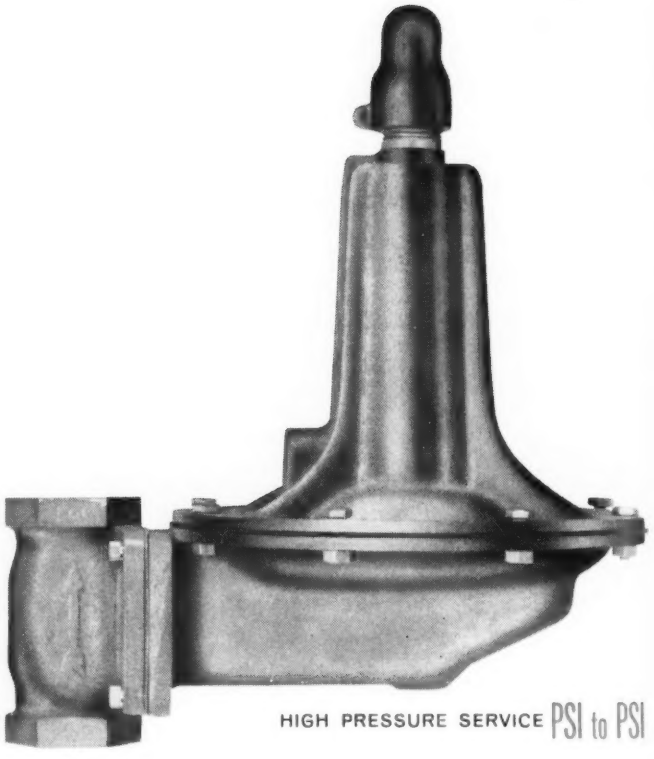

HIGH PRESSURE SERVICE PSI to PSI

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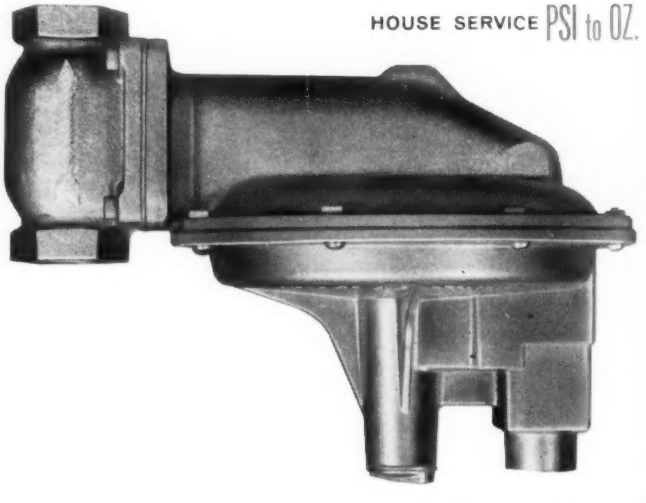
SERIES 8200



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## Editor's Notebook

**Dear Reader:**

The story of the area price ceiling to date sounds like a rough manuscript for a new "grim fairy tale."

Round Three of the price battle gets underway in Washington October 11 (at last report), postponed from the original October 3 date because a lot of producers who plan to participate in the public hearing had their business routine interrupted by a lady named Carla — a howling Gulf area hurricane that ripped through Texas in mid-September.

Round One, took place earlier in the Permian Basin sector of West Texas in the form of preliminary, exploratory sessions refereed by Examiner Marsh with quite a few producers getting into the fray.

As a result of his foray into producer territory, Examiner Marsh later concluded that area pricing might not be workable. This opinion, it seems, has been discarded by the "New Frontier" management of the FPC, which shot the examiner's horse outfrom under him in Round Two.

Round Two, if you haven't been reading the news pages, took place in Houston in late September at the annual meeting of the Independent Natural Gas Association of America. FPC Chairman Joseph C. Swidler, who only took over on September 1, put his views on the line: *Area pricing will probably be the "most important single tool" for developing a sound regulatory framework for producer rates.*

Swidler also pushed the idea that area prices should be ceilings, not floors. The only alternative to area pricing, he declared, would be utility-type cost-of-service regulation, which — although not impossible — would be long and drawn out in achieving.

A concrete step advocated by the new FPC chairman is the issuance of more policy statements to clarify FPC regulatory policies, which would help reduce the caseload, reduce litigation, and eliminate wasted time on part of all concerned.

Swidler's comments received mixed reaction. Gas men at the INGAA meeting — producers, pipeliners, and some distributors — applauded the directness of his approach to many of the commission's problems. But many disagreed with his recommendations. At the INGAA banquet, the membership voted a resolution denouncing FPC actions and recommendations regarding the gas pipeline business that endanger the financial health of the transmission companies. Two FPC commissioners were seated at the head table at the time — Jerome J. Kuykendall and Lawrence O'Conner.

*— The Editors*


# American Gas Journal®

THE MAGAZINE OF GAS DISTRIBUTION

VOLUME 188 — OCTOBER 1961 — NUMBER 11


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# MCF

## NEWS HILITES OF THE INDUSTRY

**Anchorage, Alaska residents can now heat their homes** with natural gas during the Arctic winter this year. Anchorage Natural Gas Corporation has completed and is operating its distribution system in the newest state. Gas began flowing from the Kenai Peninsula to Anchorage in late August through the new Alaska Pipe Line.

**National Fuel Gas Company has acquired Empire Gas and Fuel Company** of Wellsville, New York for some $3,000,000. Empire serves 16,000 customers in principal western New York communities of Wellsville, Andover, Bolivar, Cuba, Alfred, Almond, Canisteo, and Hornell. Empire will continue temporarily as a separate National Fuel subsidiary and later will be merged into Iroquois Gas Corporation, another National Fuel subsidiary headquartered in Buffalo.

**FPC organizational changes to speed natural gas regulatory work** took place in early September. Included were: Transfer of all electric rate regulatory functions from the former Bureau of Rates and Gas Certificates to the Bureau of Power; designation of the Bureau of Rates and Gas Certificates changed to Bureau of Natural Gas; Office of Chief Accountant changed to Office of Accounting and Finance and all power reports functions transferred to the Bureau of Power; a new Office of Economics established, reporting directly to the commission.

**Sale of Philco Corporation assets to Ford Motor Company** will put the big auto-maker in a new field and liken it more closely to its competitor, General Motors (which has an appliance division — Frigidaire). Philco will become a wholly-owned subsidiary of Ford. Philco is prominent in manufacture of electronics gear, communications equipment, and home appliances, including gas ranges and dryers.

**First public hearings on "area price ceilings"** will be held October 11 in Washington, D. C. The hearing will involve gas prices in the Permian Basin area of Eastern New Mexico and West Texas. Some 350 producers and 50 other interveners will participate in the proceeding. Hearings were postponed from original October 3 date at request of a number of producers because of Hurricane Carla, which disrupted their business plans.

**Utility re-imbursement laws have been upheld** in three states recently. In Alaska, the state's 1961 utility reimbursement act was held constitutional by the attorney general's office. No court test was deemed necessary. In Washington, a superior court judge declared the state's reimbursement law constitutional. It is expected to be appealed. In Delaware, the state supreme court has upheld the constitutionality of that state's law on utility reimbursement.

**Across-the-board price reduction of $100** on all residential-type central cooling-heating units was announced in early August by Arkla Air Conditioning Company. The firm also announced it will introduce "revolutionary" gas-fired 2 and 3-ton central heating-cooling units in 1962, designed and priced to enable the gas industry to compete in the builder and multiple housing market.

**Ontario gas consumers will have lower natural gas bills** after October 1. Consumers' Gas Company's application for rate reductions throughout the company's service area, and for all classes of customers, has been approved by the Ontario Energy Board. The move means savings up to $25 per year for residential customers with fully equipped gas homes. A new "smoke abatement rate" will be offered to permit municipalities to convert to smokeless natural gas heating for city halls and similar establishments.

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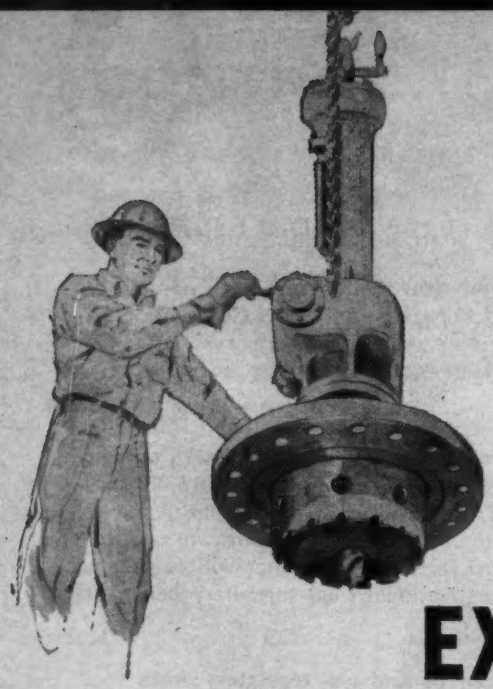

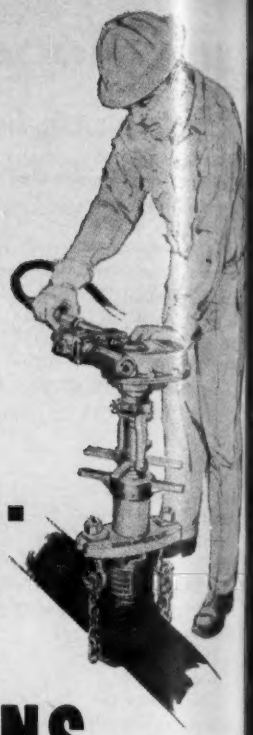

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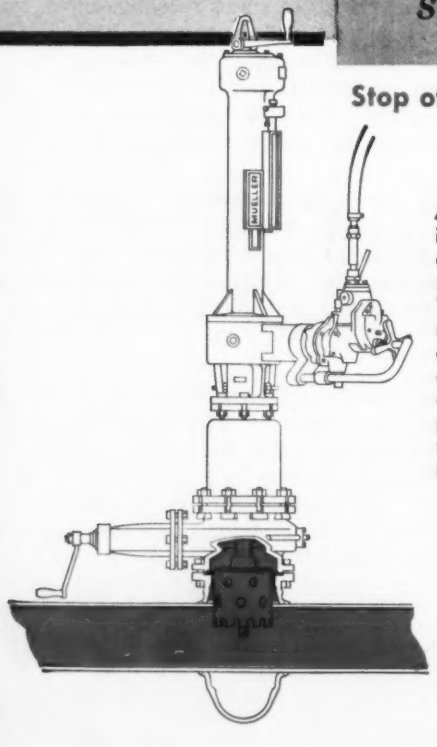
You can make repairs . . . isolate lines that need replacing . . . tie-in new piping . . . install new connections — without interrupting flow. There is no blowing of gas or fluids as you make permanent connections under full pressure and in complete safety.

Mueller® No-Blo® methods and products enable you to work on piping systems whenever needed. A complete line of Mueller fittings, valves and equipment provides an answer to most every problem of working on lines under pressure.

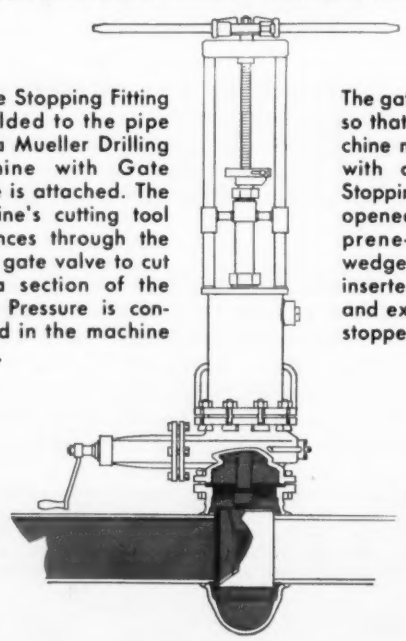
## *the inside story . . .*

**Basic steps of Mueller No-Blo Methods are shown briefly in these illustrations.**

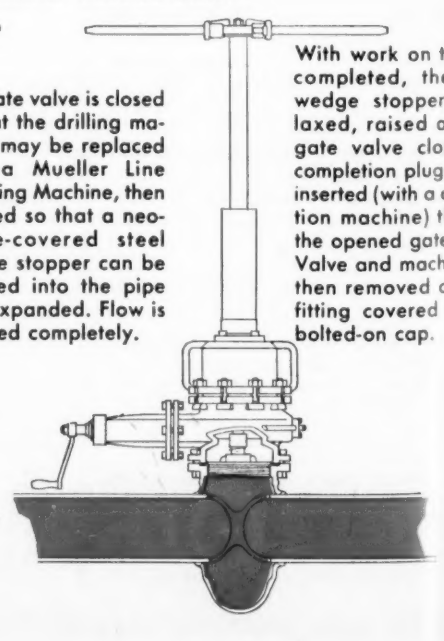
**Stop off high pressure lines where no control valves exist—**




A Line Stopping Fitting is welded to the pipe and a Mueller Drilling Machine with Gate Valve is attached. The machine's cutting tool advances through the open gate valve to cut out a section of the pipe. Pressure is contained in the machine body.



The gate valve is closed so that the drilling machine may be replaced with a Mueller Line Stopping Machine, then opened so that a neoprene-covered steel wedge stopper can be inserted into the pipe and expanded. Flow is stopped completely.



With work on the line completed, the steel wedge stopper is relaxed, raised and the gate valve closed. A completion plug is then inserted (with a completion machine) through the opened gate valve. Valve and machine are then removed and the fitting covered with a bolted-on cap.

# Calendar

OF COMING EVENTS

**October**

1- 4 A.G.A. annual convention, Dallas, Texas.

3-4 Ninth Annual Gas Measurement Institute, Southwest Kansas Center, National Guard Armory, Liberal, Kansas.

4- 6 NACE western regional conference, Benson Hotel, Portland, Oregon.

5- 6 Gas Compressor Engines Short Course, University of Oklahoma, Memorial Union Building, Norman, Oklahoma.

9-11 NACE north central regional conference, Chase Park Plaza Hotel, St. Louis, Missouri.

10-12 ASA 12th National Conference on Standards, Rice Hotel, Houston, Texas.

12-13 Florida Natural Gas Association, Distribution Conference, Palm Beach, Florida.

16-20 National Safety Council, annual meeting, Chicago, Illinois.

18-19 Wisconsin Utilities Association, gas and electric sales and operating convention, Schroeder Hotel, Milwaukee, Wisconsin.

19-20 A.G.A. Marketing Research Seminar, Essex Inn, Chicago, Illinois.

24-25 AGA-NEGA safety course, Parker House, Boston, Massachusetts.

24-26 NACE south central regional conference and exhibition, Houston, Texas.

25-26 A.G.A. Great Lakes Public Relations Workshop, Milwaukee Inn, Milwaukee, Wisconsin.

24-27 NACE south central regional conference and exhibit, Shamrock Hotel, Houston, Texas.

29-31 Independent Petroleum Association of America annual meeting, Shamrock Hilton Hotel, Houston, Texas.

30-Nov. 2 NACE northeast regional conference, New York City.

**November**

6-10 National Warm Air Heating and Air Conditioning Association, LaSalle Hotel, Chicago, Illinois.

13-15 American Petroleum Institute, annual meeting, Chicago, Illinois.

26-Dec. 1 American Society of Mechanical Engineers, New York, New York.

27-29 A.G.A. Accounting Section Electronics Seminar, Sheraton-Cleveland Hotel, Cleveland, Ohio.

27-Dec. 1 NACE southeast regional conference and Florida general conference short course, Key Biscayne Hotel, Miami, Florida.

**December**

4-5 Florida Natural Gas Association, Annual Sales Conference, Sarasota, Florida.

**January**

17 NEGA-Operating Division, Monticello Restaurant, Framingham, Massachusetts.

**February**

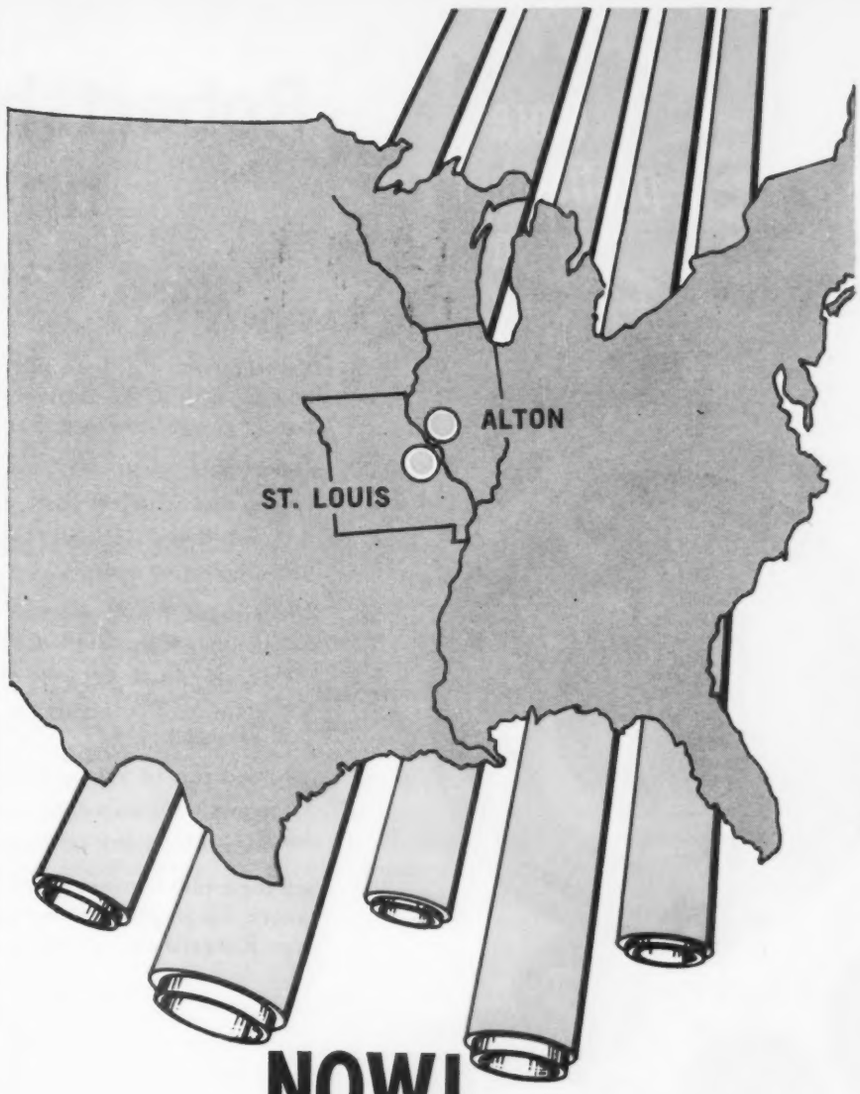
14-16 A.G.A. Home Service Workshop, Milwaukee Inn, Milwaukee, Wisconsin.

**March**

4-6 Institute of Appliance Manufacturers annual convention, Netherland Hilton, Cincinnati, Ohio.

4-8 ASME Gas Turbine-Process Industries conference, Shamrock-Hilton Hotel, Houston, Texas.

19-23 NACE 18th annual conference and 1962 corrosion show, Kansas City, Missouri.


**NOW!**

from SPI's new Alton, Illinois Plant

comes **STANDARD X-TRU-COAT**

Standard Pipeprotection's new plant at Alton, Illinois has been shipping Standard X-Tru-Coat pipe to the Southwest and West since early July. Sizes available include ¾" Nom. through 4½" O.D.

X-Tru-Coat high density polyethylene plastic coating for pipe is produced under the DeKoron process — Pat. Nos. 2,447,420 and 2,467,642 — and is extruded on pipe over a pressure sensitive adhesive.

Standard Procedures assuring top quality prevail at the Alton, Illinois plant, as they have for many years at SPI's coating and wrapping plant in St. Louis. In-Transit privileges are available at both plants from any pipe mill.

Standard Pipeprotection, with the introduction of X-Tru-Coat, has continued to contribute to the progress of the oil and gas industry.

*Write for complete information and for Price List Number X-1.*

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# Robertshaw controls up-grade gas range sales!

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Robertshaw FLAME SET,® the newest "*burner-with-a-brain*" means:

- no more burned pans
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- simplest to operate
- no more scorched food
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Robertshaw FLAME MASTER® means full oven control for cooking and baking, *plus* these low temperature features:

- roasts can be kept for hours . . . just right
- plates can be heated at low, low temperatures that "pamper" the finest china
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Sell these plus features on your deluxe-line Robertshaw-equipped gas ranges. *Up-grade the sale and up your profits.* Enjoy more *profit*-ability . . . from Robertshaw . . . the name that MEANS temperature control.

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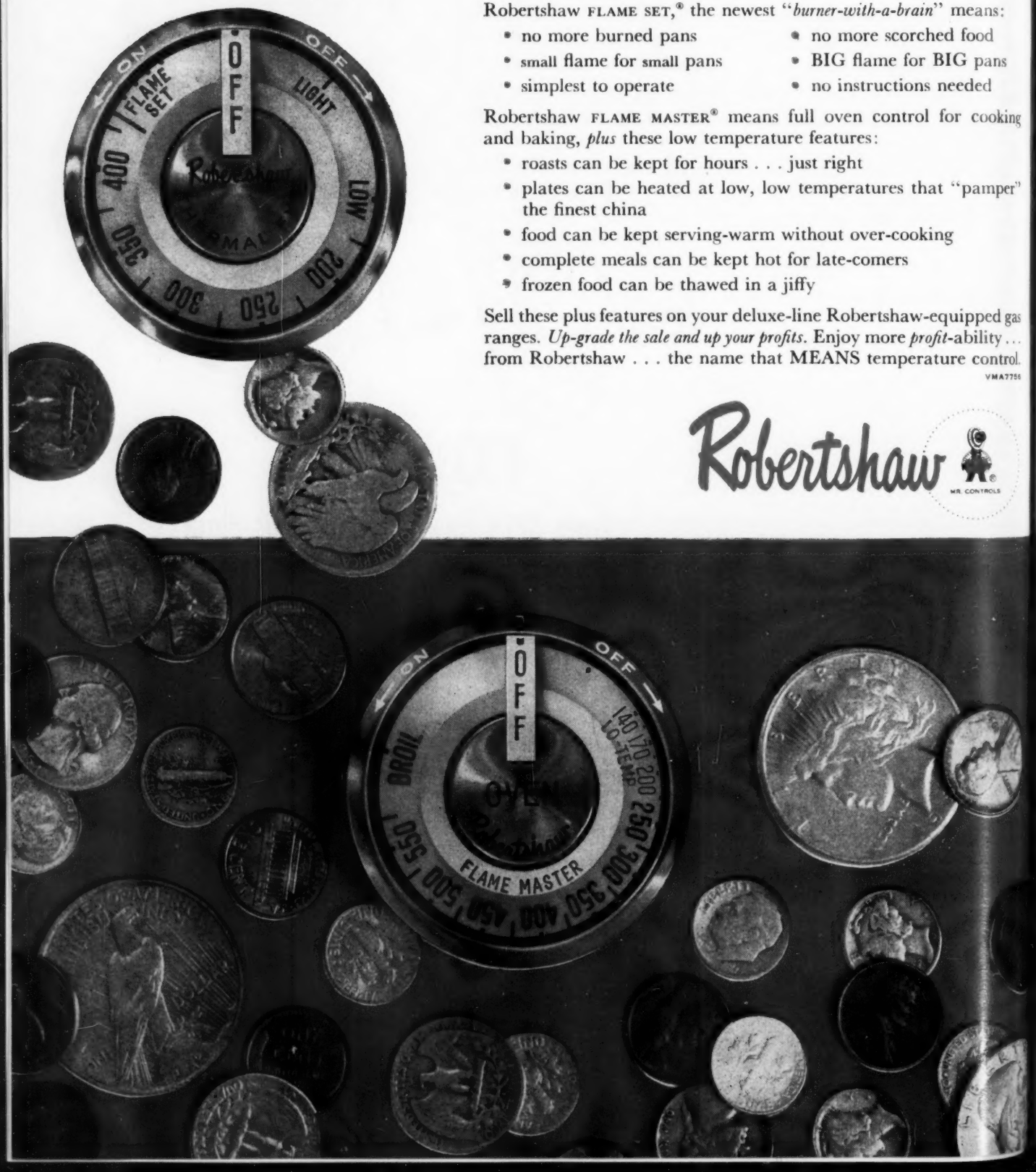

# Distribution Contractors' Association Deserves Industry's All-Out Support

CONGRATULATIONS to the 35 distribution contracting firms who have joined the newly formed Distribution Contractors Association! And a hearty vote of appreciation to those men who — through hard work and determination — helped organize this vitally needed new group!

Special commendations are due to such men as Emerson Clark of Engineering-Construction Company, DCA's first president and chairman of the organizational committee; W. C. Donaldson of Underground Constructors; A. T. Everham of Midwestern Contractors; Deane Baker of Somerville Construction Company; and a host of others who worked tirelessly to insure the formation and initial success of the DCA.

Distribution contractors are an important part of the gas distribution industry that — until the formation of the DCA — has not received adequate recognition for its contribution from the industry as a whole.

Importance of distribution contractors is emphasized in survey statistics published by AMERICAN GAS JOURNAL in its March 1961 issue: in 1960, distribution contractors installed 50.6% of the 12,100 miles of gas distribution mains laid and 30.2% of 7200 miles of gas service lines laid.

There are an estimated 600 distribution contracting firms operating some 1000 "spreads" of equipment in the U. S. and Canada. These firms range from small, single-spread, local companies to large, multi-spread organizations operating nationally.

Distribution contractors are valuable allies to the gas distribution companies' operations. For some, the contractors perform all construction work; for others, they serve as "peak shavers" when company forces cannot handle the volume; many utilities do the smallest work and use contractors for the largest work.

To do these many jobs, the distribution contractors annually buy and use millions of dollars of construction equipment, materials, and supplies. In many instances, contractors do turn-key jobs — complete distribution system installations, including mains, services, meter sets, regulators, and related equipment.

Distribution contracting is a highly specialized field. Installation of gas mains and services in city streets and customers' yards differs vastly from that of "main line" construction in open country. Distribution contracting personnel must be skilled not only in their trade, but capable of working under conditions that "big inch" pipeliners would consider cramped, if not unworkable. Tools and equipment needed are different, too— smaller, more compact, more mobile, highly specialized, versatile.

Distribution contractors must also be adept at maintaining good public relations — their work keeps them in constant touch with the gas consuming public. "Dig they must — for better cities," is their unwritten motto.

AMERICAN GAS JOURNAL is especially pleased to report the organization of the Distribution Contractors Association. Since January 1956, when AGJ became the gas industry's first publication devoted exclusively to gas distribution, this publication has worked for greater recognition of the distribution contractor. AGJ has worked with the distribution utilities and the contractors to develop editorial features of mutual benefit. Activities of the contractors are featured monthly in our "Distribution Developments" section.

Today, AGJ is read regularly by more than 700 contractors' personnel in over 500 contracting firms. To each of these firms, we suggest they investigate becoming members of the Distribution Contractors Association. Participation will enable members to become more proficient and efficient in their work, and through organized effort, the contractors can improve their methods, promote safety, and build a better public image.

Likewise, the gas distribution industry — the utilities, manufacturers, and suppliers — are also urged to support this new organization. American Gas Journal pledges its continuing support — a continuation of its pioneering efforts of the past six years.

DEAN HALE

Editor

# Big years ahead for the Gas Industry

## *. . . and here's how Rockwell Research will help you benefit from them*

From humble beginnings the gas industry has grown at a tremendous rate. Based on plant investment it has risen to No. 5 position among all American industries.

Today more than 40 million customers use gas in over 100 million appliances. Experts predict that at the end of the next 20 years the number of gas appliances in use will have tripled.

Research is the key to continued growth—research that will pour forth a steady stream of new or improved products for use all the way from well head to burner.

Rockwell Research is dedicated not just to keeping abreast of your needs but ahead of them with equipment that will measure and/or control better, longer and at lower costs.

Over 200 skilled engineers and technicians work in our modern laboratories. They create and develop new products. They constantly strive to improve our existing products. Pictured and described here are five of the latest developments.

Our huge investment in research is made in the conviction that opportunities for all in the gas business were never brighter—that our development of new and better meters, instruments, regulators and valves is for your best interests as well as ours.

METERS, REGULATORS, VALVES

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## NEW

### THE TEMCORECTOR

**Provides automatic corrections for pressure and temperature**

This gauge gives you a direct reading *on a counter* of metered volume corrected both to contract base pressure and to 60°F temperature. A second counter records measurement at line pressure and temperature. Static pressure and temperature are shown on indicating scales. Adaptor plates are available for other makes of meters.

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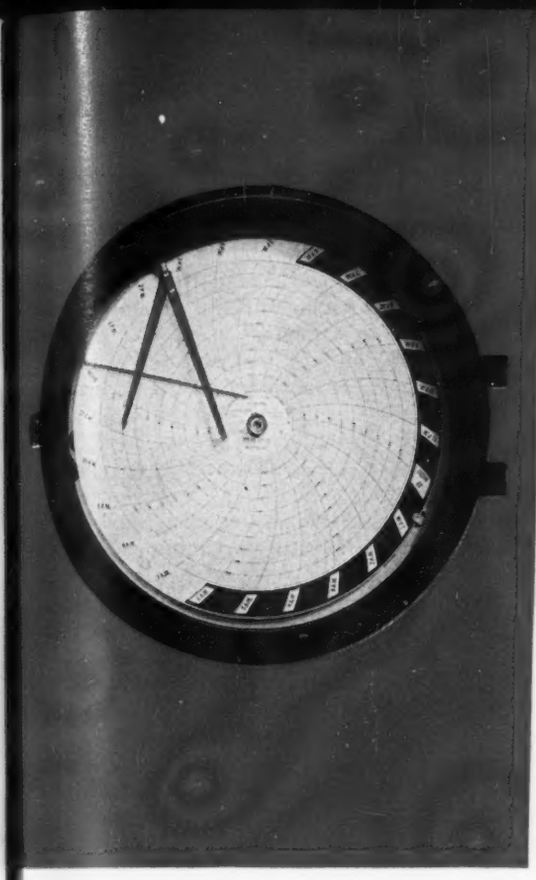
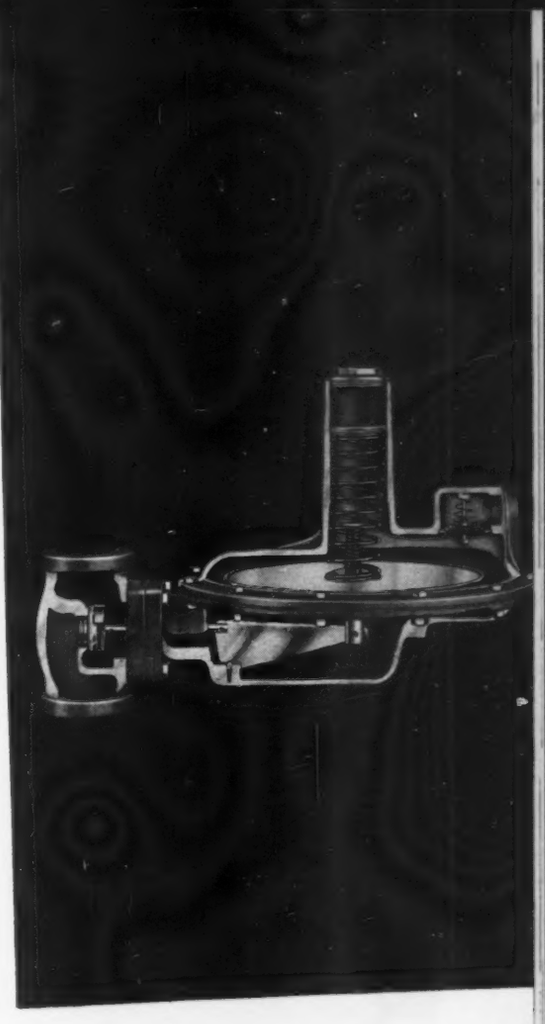


## NEW
### THE "205" SERIES RECORDER

**Records temperature, pressure or both**

This clock driven chart gauge can be fitted optionally with either one or two pens. The single pen will trace temperature or pressure. The two-pen type will record two pressures, two temperatures or a combination of either. Conversions from one or two pens or a change in range are made using only a screw driver.



## NEW
### THE "243" SERVICE REGULATOR (2-inch size)

**Largest capacity in pounds to inches, pounds to pounds regulation**

Offers you greater capacity than can be obtained from any other 2-inch service regulator. Two-piece construction makes it easy to install—permits positioning the diaphragm case in any one of four locations. A large 2-way breather valve protects against shock loads—assures quick response. Internal relief is optional.

# New Products From Rockwell Research That Benefit You

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### THE "R-300" SERIES REGULATOR

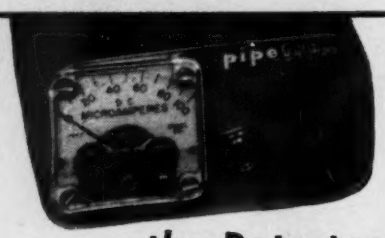
**Unsurpassed performance in compact space**

If your system lends itself to the use of small regulators, this new design will serve you economically and well. The diaphragm assembly is die cast aluminum with ¾-inch side vent. It mounts on a 90° cast iron body in any of four positions. Orifices are interchangeable without removing body from line. Meets B-31 code.

## NEW
### TEMPERATURE COMPENSATED METERS

**Assure accuracy to a set temperature base**

Utilities who install meters out-of-doors can now earn full revenue in even the coldest weather. A simple bimetal compensator, built right into the meter, adjusts your measurement automatically to a 60°F base temperature. Available for all Rockwell meters within the 175 cfh to 750 cfh range.



**the Detector that Lets You see BURIED HOLIDAYS**

The new Pipetron all-transistorized Model 506 Detector "looks through the soil" to give you meter-accuracy to pin-point buried holidays . . . and provides a strong audio signal for positive 2-Way detection.

Both the powerful professionally designed detector and transmitter are equipped with meters for high accuracy to reduce digging to an absolute minimum. The unit also locates pipelines and shorts.

Write for complete facts about this compact, easy-to-handle instrument in our circular "You Can't Afford to Keep Buried Holidays a Secret".

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It's the right combination of materials for more years of smooth, friction-free operation without wear.

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# Newsreel

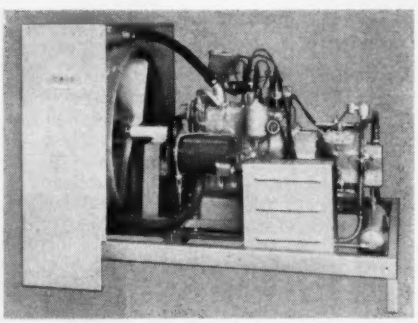
**New "Voice of Gas Industry."** Jinx Falkenburg will appear as spokeswoman for the A.G.A. on its new NBC-TV series Theater 62. With her are Chester S. Stackpole (left), managing director of A.G.A., and S. F. Wikstrom, director of A.G.A.'s promotion, advertising and research program.

## SGA Reduces Prices On Distribution Study Course

SGA's Distribution Home Study Course Committee has reduced prices on the course for SGA member companies. New price makes the course available under Plan I (individual plan) for $50 and Plan II (company plan) for $25. Previous price of $60 for Plan I and $30 for Plan II will remain in effect for non-SGA members.

Tremendous response of over 1200 enrollments includes a substantial number from non-SGA members.

The Home Study Course has been revised to include the very latest study material and statistical reports, charts, cost figures, and related materials in up-dated form.



## GasCool Engine-Driven A/C Unit Receives 1st A.G.A. Lab Approval

First unit to receive A.G.A. Laboratories approval and certification for natural gas engine-driven air conditioning equipment is the Gascool model O5A-1, a five-ton remote condensing unit. The unit will be on display and operating during the A.G.A. annual convention in Dallas at the Dallas Trade Mart.

Powered by a 4-cylinder, 4-cycle, liquid cooled engine fueled with natural gas, the unit features a direct coupled compressor and fully automatic operation on thermostat control.

Use rate of the unit is 21 cu ft per ton hour of 1000 Btu gas. The unit is rated at 100 F ambient air and 40 F refrigeration suction temperature, which exceeds conventional ASHRAE requirements of 95 F ambient and 45 F refrigerant suction.

The Gascool machine has an air-cooled condenser with the fan driven by the engine, requiring no electric power. Electrical requirements are at a minimum — for ignition, control system, and for the engine starting motor. The long-life engine runs at moderate speed — 1400 to 1500 rpm. Engine was developed under the PAR research program.

Gascool is also producing models of 3 through 15-ton capacity of the same family design and plans to submit other models for A.G.A. Laboratories approval. Development and approval of the 5-ton unit is considered a significant breakthrough in the gas air conditioning field.

## Gas Light "Day" Sells 6000

A "Gas Light Day" promotional campaign September 13 at Lone Star Gas Company, Dallas, resulted in an average sale of one gas light for each of the company's 6000 employees.

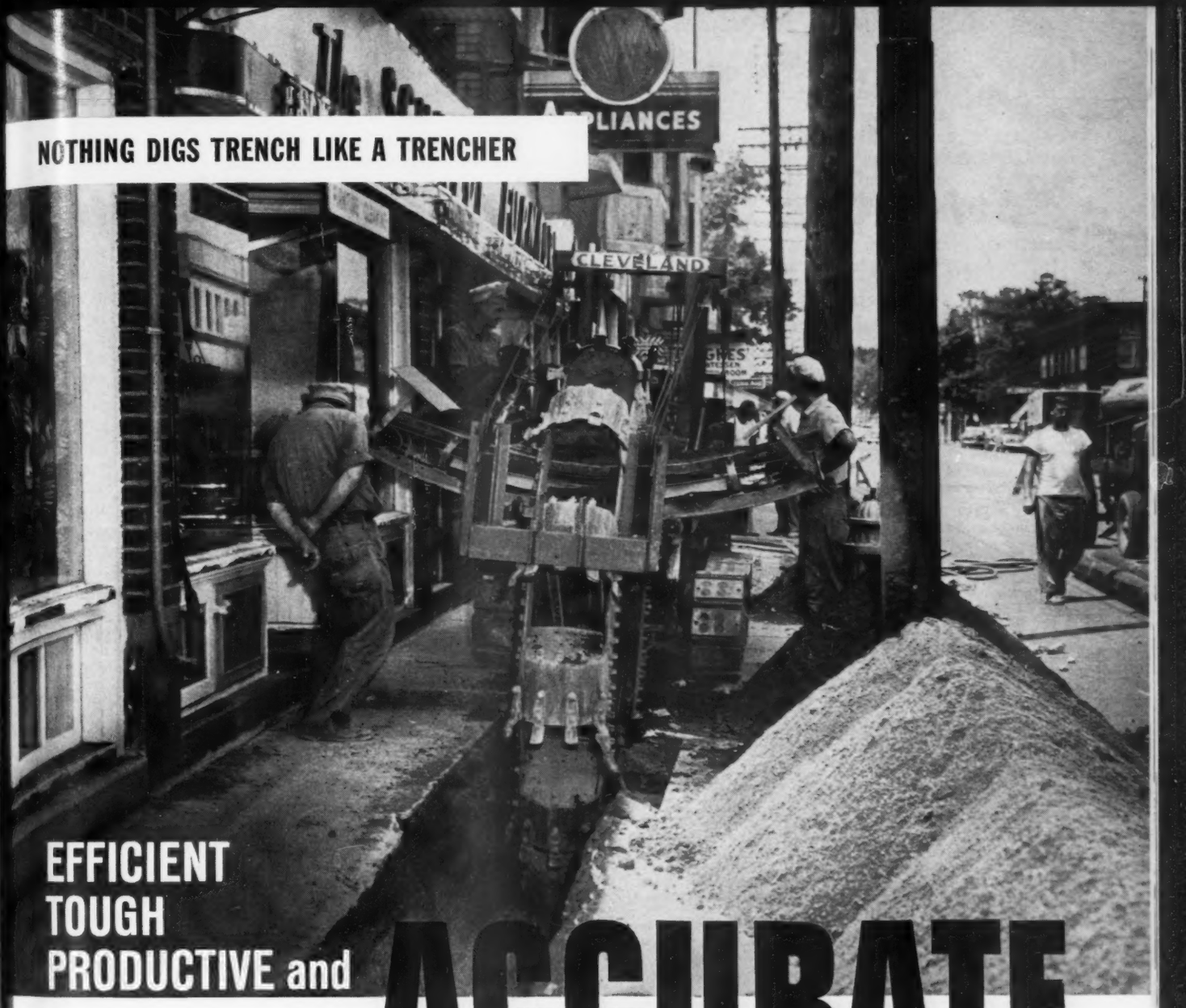
An employee special price announced in advance of the campaign helped to build up enthusiasm.

Purchase of more than one gas light by the customer also was encouraged by offering a second gas light during the campaign at half price when installed at same address.

## Controls Company Expands, Acquires Thermac Division

Controls Company of America has broadly extended its range of gas heating controls through the acquisition of the Thermac Company of Corona, California.

Thermac, a nationally-known manufacturer of manual shut-off gas valves, pressure regulators, and combination control valves for residential, commercial, and industrial gas-fired equipment, is being integrated into the Controls Company corporate structure as the Thermac Gas Division. It will take over manufacture and sale of gas controls and automatic gas ignition systems previously manufactured by CCA's heating and air conditioning division in Milwaukee.




## NOTHING DIGS TRENCH LIKE A TRENCHER

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No other type of excavating machine digs trench with such precision as the modern, full-crawler-mounted, wheel-type trencher – the trencher originated and perfected by The Cleveland Trencher Company.

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Investigate now the profit potential of a modern trencher – a fast, dependable, accurate Cleveland Trencher.

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# Soviet Gas Industry Geared to Industry

**Natural gas operations in the U. S. S. R. are gaining, U. S. gas men report after month-long visit; 89% of gas produced is used by industry, residential consumer of minor importance in state-dominated economy.**

*Ernestine Adams, Management and Economics Editor*

How does the Soviet natural gas industry compare to that in the United States? That was the chief interest of eight American gas authorities who visited the USSR recently under the 1959 agreement on scientific and cultural exchanges. The visit of the Soviet group to U. S. installations has been postponed.

● **Management.** In the planning and execution of natural gas operations, the U. S. industry has thousands of producers, hundreds of pipeline companies, liquid gas processers, and distribution firms.

In the Soviet, the entire natural gas industry is headed by a single agency, GLAVGAS. One of the U. S. group, Baxter Goodrich, senior vice president of Texas Eastern Transmission Corporation, explains that GLAVGAS works with the State Planning Committee, GOSPLAN, carrying out operations the latter decides upon.

"In GLAVGAS are Institutes, the medium through which plans and designs are formulated. The Institutes constitute a concentrated technical group of people to whom specific problems are assigned. This concentration is seen as having some appealing aspects compared with U. S. pipelining, where individual companies do independent work on problems common to all," said Goodrich.

"Russia has a seven-year plan terminating in 1965 that has as its goals the laying of approximately 16,000 miles of pipelines and increasing gas production by 500%. Part of this program has been achieved or is underway. Accomplishments include discoveries of several gas fields and construction of pipelines."

Speaking generally on Soviet management, Paul W. Kraemer, vice president of Minneapolis Gas Company, observed that in the USSR the emphasis is not on the individual, but on economic power. The gas industry fits into that general conclusion.

"The prime purpose in the development of gas reserves is for the benefit of industry. It seemed apparent to me that, since natural gas is the prime energy source, both as to utilization and to cost, it is a USSR necessity to devote all natural gas possible to supply industry."

Soviet centralized state planning in the gas industry impressed William R. Connole, Washington lawyer and former FPC commissioner:

"Dominating all impressions of technical or engineering competence were economic and political impressions. Of course, this is not to say I was not deeply struck by the technical know-how of the Soviets. There is no mistaking skill and competence that can develop an industry from a poor last place as an energy source to a front runner, all within a space of a decade," declared Connole.

"But this I had expected to see. It was what the USSR boasts about. What I saw that wasn't expected was this:

"The Soviet energy economy is a powerful monolith. It moves ahead irresistibly once the political decision to emphasize it has been made. In 1955, natural gas provided only 2.4% of the total primary energy needs of the Soviet Union. In 1965, it will supply 17.5%! Or, consider this comparison. Natural gas provided only 2.6% of the total fuel needs for electric generation in 1955. But, by 1965 it will supply nearly a quarter, 24.8%."

● **Production and Reserves.** R. B. Stewart, vice president, natural gas, Phillips Petroleum Company, a member of the party visiting Russia, summarized Soviet vs U. S. output and reserves this way:

"The Soviet gas industry is definitely in its infancy. It produced only 1.66 trillion cubic feet in 1960 and has a planned production for 1965, the last year of the current seven-year plan, of only 5.3 trillion cubic feet. The U. S., by comparison, was producing at the rate of 5 trillion per year in 1946 from a proved reserve of over 160 trillion.

"Russia's proved gas reserves are now only about 70 trillion cubic feet; their goal for the end of 1965 is 107 trillion. To reach this goal, they must increase their proved reserves an average of 10 to 12 trillion cubic feet per year. U. S. annual increases since 1945 have varied from 10 to 24 trillion, bringing our proved reserves from 148 to 263 trillion cubic feet.

"To say that this industry is in its infancy is not to deny its potential. Actually, nearly all of the Soviet gas industry has developed in the postwar years, with the greatest emphasis developing in the last five or six. The discovery of the Krasnodar deposits and the huge Shebalinka field south of Karkov, as well as the completion of the first phase of the Stavropol-Moscow pipeline system, all occurred in 1956. Gazli field, the largest in the USSR, has been discovered since then. Natural gas is unquestionably going to play a major role in Russia's industrial and economic future."

● **Facilities.** The U. S. group visited a 40-in. line under construction from Stavropol to Moscow, a distance of about 750 miles. Generally, construction practices were similar to those in U. S., Goodrich said, and equipment looked familiar.

Largest proposed project is for dual 40-in. lines that will run from Gazli 1500 miles to industrial centers east of the Urals. The 40-in. pipe comes from West Germany. Largest pipe fabricated in Russia at present is 28-in.

Largest U. S. pipeline is 36-in. This probably is the result of different companies transmitting gas to consuming areas.

"There is no target date for completion of any one project," Goodrich adds. "Progress is geared to the dictum that

every workman is allowed to work seven hours a day, six days a week throughout the year. If progress seems to be too rapid, work is slowed down. The dual 40-in. lines are scheduled for 1965 completion."

Kraemer noticed the difference in approach on different facilities: He said, "The Soviet concept of gas energy for industry is evident in the machinery facilities and work methods devoted to the transmission of gas as opposed to the distribution of gas within cities for domestic users.

It was obvious that a great amount of engineering and research has been and is being devoted to the moving of gas from the fields through the transmission systems. On the other hand, it appears that construction of city distribution systems and manufacture of domestic appliances for the utilization of gas receive a minimum of effort."

Samuel J. Cunningham, American Gas association, senior research engineer, another member of the delegation, thought all Russian facilities were of a piece.

He pointed out that "the entire Soviet Union was very drab and there is an almost complete lack of the 'niceties.' This reflects in the Soviet gas industry because this area is also very colorless. The entire physical plant of the industry looks old and tired, although most of it is actually very new. Somewhere along the line the Russians have mastered the knack of using new materials to build old buildings.

"Equipment (compressors, valves, regulators) is either old or looks old. Many reciprocating compressors are old U. S. built models (lend-lease) or copies of the same. Centrifugal equipment is large (bulky) for its horsepower rating. We saw gas turbines under construction that were rather primitive by U. S. industry standards."

● **Natural Gasoline.** With his background, Mr. Stewart's comments on LPG are of interest:

"I was surprised to find Russia's natural gasoline industry a relatively small operation. The few gasoline plants presently operating are oil absorption plants processing casinghead only.

"The Russians are now building their first ammonia refrigeration plant in the Ural-Volga area near Mukhanova.

"There are no extraction plants on the large volumes from the prolific gas-producing areas of the North Causasus and the Ukraine Republic. They say they have two small oil absorption plants being built for casinghead gas in these areas, but the high-pressure gas well gas, very predominant in the Russian gas picture, is too lean for economical processing.

"In 1960 their LPG production was only 318,000 tons; it is expected to be 416,000 tons in 1961."

● **Storage.** Russia's methods of producing and storing gas are perhaps 10 years behind those of the U. S., says President H. A. Eddins of the Oklahoma Natural Gas Company, Tulsa.

Eddins noted that, while underground storage reservoirs are fairly common in this country, the Russians have only one, near Leningrad.

● **Distribution.** The difference in who uses gas energy is pronounced. Consumption by individuals is low and the aim is for less in the USSR. According to Cunningham, "The Americans were told that at present 11% of gas produced is used for residential purposes and 89% for industry. Soviet spokesmen said that this ratio will change to 5% for domestic and 95% for industry in 1965."

In the U. S. about 55% of all gas is used by industry, while one-third goes to residential customers and the remainder to commercial and other consumers. It would seem from Russian figures that all residential consumption of natural gas runs less than 500,000 Mcf per day.

Eddins points out that Soviet gas is distributed primarily for power plants and heavy industry. "Soviet distribution methods differ considerably from ours. They have no residential meters. They estimate over a period of time how much will be used for a house per person. They give them a booklet or coupons based on the number of people in the family, and they tear out one of those coupons every month and go down and pay one of the Russian banks for their gas bill. Industrial customers read their own meters and figure out the bill from that and pay accordingly."

● **Exports in the Future?** In 1960, the U. S. produced 13.2 trillion cu ft of natural gas; the Soviet 1.66 trillion cu ft. In 1965, the U. S. is expected to produce about 16 trillion; Russia has set 5.3 trillion as a target.

None of the eight Americans voiced skepticism that the Soviet would reach its goal.

Connole warned: "It is plain that Western Europe must develop its indigenous natural gas supplies before Soviet domestic goals are met and a surplus is available for export. At present, there is time because USSR is straining to change from a coal-based to an oil-and-gas based energy economy.

"They have the will, the technical competence and, above all, the single-minded purpose of a totally state-oriented industry. All they lack is time.

"Europe must develop its Sahara imports, its Lacq fields, its Groningen fields and establish a physical connection that will make it difficult if not impossible for Soviet gas to invade Western Europe. Then artificial price competition from a state economy will not be able to entangle Europe's increasingly oil-gas based economy in a net of Soviet pipelines built after her domestic needs have been met.

"The Soviet gas economy can and will do it because, primarily, it knows what it wants and where it is going. The Free World, and especially Western Europe, must make up its mind where it is going before too late."

This view was seconded by Cunningham: "I believe the USSR may, at some early date, attempt to export gas to Europe and use this exported gas as an economic lever much as it is now using exported petroleum to shake that world market. If this does take place, watch for immediate progress within the industry. The current lack of compressors and pipe will become a thing of the past and gas production will be greatly increased to keep pace with increased oil production."

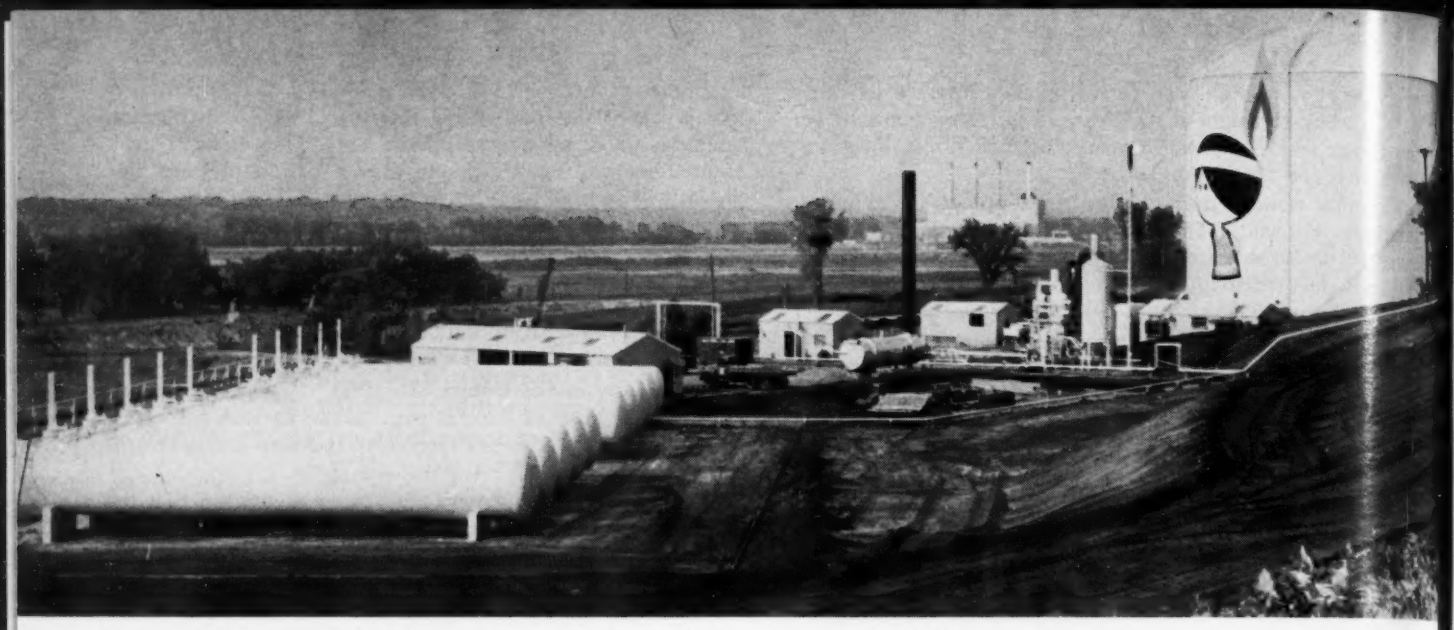
Stewart points out remindfully, "The Russians have no methods, techniques, or equipment in their gas operations that we do not use or have in the United States. They obviously have copied our methods and they study our literature diligently."

His comment is backed up by others in the group who found U. S. technical publications were translated and, evidently, thoroughly studied.

If Russia develops more gas than needed to take care of Soviet needs, some satellite countries could expect pipelines run into their boundaries, Eddins believes.

This sounds more reasonable than lines into Western Europe, unless world conditions change. Nations in Western Europe buy cheap Russian oil but they keep well hedged against stoppage with western contracts. Gas could be shutoff and energy starvation could be sudden.

What did the U. S. group learn that is valuable information? Among other things, the Soviet gas industry is booming but this year is behind in its Seven-Year Plan. Technically, the Soviet follows US methods but personnel-wise it uses many more people, including women, and has complete disregard for safety. Differences between U. S. and Soviet industry are wide in scope and this will probably be true far in the future. * * *



View of Minnegasco's Dakota County Propane-Air Station shows, left to right: Ten 30,000-gal pressure tanks; office and air compressor building (behind tanks); control building; vaporizer; holding compressor building; combination vessels and purger; direct fired heater; flare stack; filling compressor building and 120,000-bbl refrigerated storage tank.

# World's Largest Refrigerated LPG

**The world's largest refrigerated storage facility for liquid propane is now in service at the Dakota County Peak Shaving Station of Minneapolis Gas Company.** Addition of the huge above-ground cryogenic storage tank, which serves a new 750,000 cu ft per hr propane-air gas plant on the same site, nearly doubles Minnegasco's propane storage capacity.

Decision to use refrigerated storage in its program to increase existing propane storage and peak shaving facilities was made by Minneapolis Gas only after careful investigation of all possible methods. Additional peak shaving facilities would mean that pipeline demand charges could be kept down and winter peak gas requirements could still be met.

Early exploration of the problem revealed that the nearest cavern type storage was 90 miles away from the present distribution system. Because of transportation problems, cavern type storage was considered undesirable at this time.

Further studies indicated that the cost per gallon (for storage) using refrigerated storage, would be about 80% of the cost for an equal amount of cavern storage, and 25% of the cost of an equal volume of pressure storage. These facts led to the construction of the Dakota County Peak Shaving Station.

In October 1960, a contract was let to Chicago Bridge and Iron to construct a 120,000 bbl water capacity low temperature storage tank along with the necessary equipment needed for filling and holding refrigeration. The tank holds 120,000 bbl of propane at –50 F, equal to 5,800,000 gal at 60 F.

Simultaneously, Minneapolis Gas began formulating plans for a propane-air plant on the same site. This winter the new station will have a mixing capacity of 1400 Btu propane-air gas equivalent to 750,000 cu ft of 1000 Btu natural gas per hour. The propane-air mixture will be discharged into natural gas lines at 175 psig.

The location selected for the storage and peak shaving facilities is ideal for several reasons:

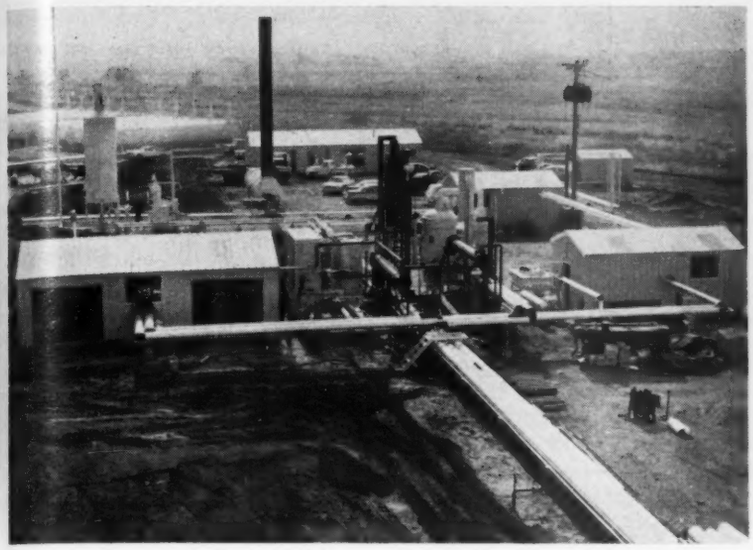
1. Three of the five high pressure natural gas mains feeding the city pass through the property.
2. A railroad and a highway run parallel and on opposite sides of the property.
3. A large tract of land was available, providing adequate acreage for present construction and future expansion.
4. The property is remote from any domestic housing and therefore creates no unusual noise or safety problems.

All of Minneapolis Gas Company's peak shaving plants are designed for operation at a constant mixing rate. Simplicity and manual control is incorporated into all design. Modulation of propane-air production is accomplished by starting up or shutting down one or more plants; therefore, no elaborate automatic proportioning controls are needed. The Dakota County peak shaving plant has been designed with the same simplicity in mind.

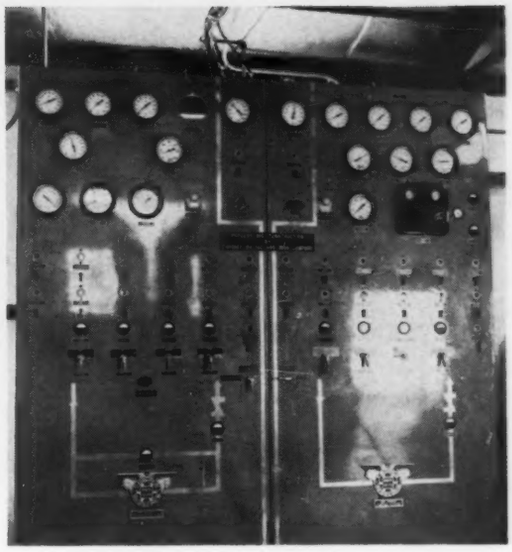
## Propane Receival

Propane liquid can be received either by truck transport or railroad tank car. Ten 30,000-gal above-ground pressure vessels are used as receivers for incoming propane. It is possible to unload pressure storage at approximately four times the rate required for cooling down to refrigerated storage temperature. This eliminates the unloading of product at night, on Sundays and holidays. A 4-in. liquid line and a 2-in. vapor line loop the tanks and tie into headers common to all liquid and vapor piping. During hot weather, vapor pressure alone is used to transfer liquid from pressure storage to refrigerated storage. In cooler weather, the same vapor compressors used in unloading of tank cars are used to pressurize the 30,000-gal tanks.

A 1700 foot railroad siding was constructed that will accommodate 15 tank cars at one time. Two steel unloading towers having counterbalanced walkways and swivel piping are used for the connection of tank cars to the



View from the tank includes, left to right, filling compressor building, evaporative condensers, purger and combination vessels, air condenser, and holding compressor building.



All-pneumatic system provides automatic controls for filling compressors.

# Storage Facility

**Gordon Lillquist,** *Project Engineer, Minneapolis Gas Company*
**Warren T. Vann,** *Project Engineer, Chicago Bridge and Iron Company*
**and**
**Bob Maher,** *Mechanical Engineer, Chicago Bridge and Iron Company*

vapor and liquid systems. Aboveground piping from unloading towers to plant area, which is 1200 ft distant, provides for transfer of liquid and vapor. Two 7½-hp vapor compressors housed in the plant area are used to remove liquid from tank cars and for subsequent drawing off of vapors. Strainers, sight glasses, and valves are arranged so that liquid can be unloaded for storage or loaded into tank cars for transfer to other Minneapolis Gas propane stations.

Three truck unloading racks furnish facilities for unloading of truck transports. These racks are 1000 feet distant and on the opposite side of the plant from the railroad siding. A 4-in. liquid line and a 2-in. vapor line run above ground, and down the side of a bluff, to headers in the plant area. Liquid pumps on the trucks are used to transfer product to pressure storage, refrigerated storage, or both at the same time. Transport connections, at the racks, are arranged for both unloading and loading of liquid propane.

## Propane-Air Gas Production

Production of propane-air normally will utilize liquid propane from the refrigerated storage tank. Two vertical centrifugal pumps, rated at 200 gal per min each and connected to bottom outlets of the refrigerated tank, furnish the means for propane liquid removal. The liquid passes through a direct fired heater which has capacity for heating 24,000 gal per hr from storage temperature to + 40 F.

Liquid out of the heater goes thru a header common to all liquid piping where it may be routed to railroad tank cars or truck transports for transfer to any of the other Minnegasco peak shaving plants; back to the 10 pressure storage tanks, or directly to a vaporizer for propane-air production.

The vaporizer is of the indirect-fired water bath type. It is sized for vaporizing 10,000 gal of propane liquid per hour at 240 psig, from a +40 F to 175 F. Natural gas is used for fuel. A temperature controller on the vapor outlet modulates the fuel input, and high water bath temperature acts as a high limit by closing a valve in the natural gas fuel line. Electronic flame safety is also incorporated in the burner design.

Air for mixing is provided by three, two stage, skid mounted air compressors driven directly by natural gas engines. Pushbutton starting with complete automatic operation of engines and compressors has been included in the design. Regulators downstream of the second stage discharge by-pass air to atmosphere to maintain a 2 psig differential between inlet air at the jet and the main line natural gas pressure.

## Air Compressors

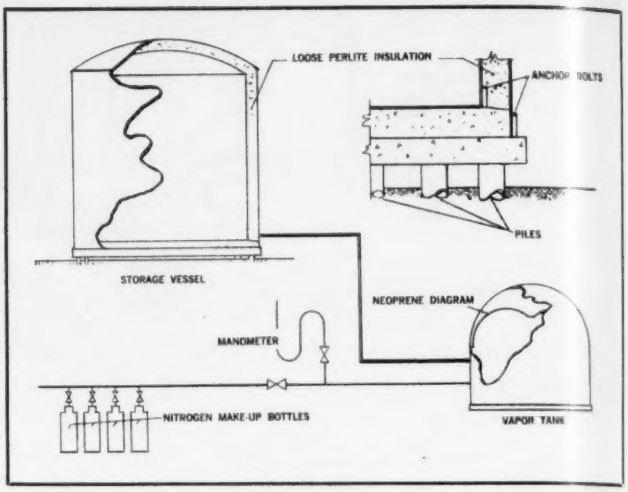
The compressors are each rated at 1710 cfm and 175 psig discharge. They are equipped with single-step automatic pneumatic unloaders for use during start up. Loading during operation can be adjusted by hand operated fixed volume clearance pockets. Safety shutdowns are provided for compressor low oil pressure, intermediate high air temperature, and discharge high air temperature.

Spark-ignited, 12-cylinder, natural gas engines, equipped with electric starting, drive the air compressors. The rating of each of the three engines is 455 bhp at 1000 rpm. Engines automatically shut down on high water temperature, low oil pressure or overspeed. A two-section radiator is mounted on the same skid as engine and compressor. One section of the radiator is used for air intercooling between compression stages and the other for engine and compressor cooling water.

## Gas Mixing

Proportioning of air to propane vapor is done manually at the mixing jet, varying air only to obtain the desired Btu of propane-air gas. The mixing jets are of the jet compressor type and discharge at about 5 psi higher than inlet air pressure. Btu content and specific gravity of the mixed gas are recorded in the plant office. These two recordings plus the observations of a three-burner calibrated hot plate and a flame

Aerial view of tank during construction illustrates the two-shell design. Annular space between tank walls is filled with perlite for insulation.




Flow diagram and construction details of storage vessel and vapor tank.

calorimeter are used as a basis for any change made during the mixing of propane and air.

At present, the propane-air mixing jet is tied into two of the three high pressure mains that pass through the property. Propane-air can be injected into either of these mains. Excellent dilution with natural gas is obtained as natural gas flows through each of these mains at approximately 4,000,000 cu ft per hr during the winter.

Additional alarms and safety shutdowns are provided to insure satisfactory production of propane-air. One alarm utilizes a differential pressure switch to shut down engines in case air discharge pressure becomes higher than natural gas pressure in the mains. Alarms sound if vapor temperature or Btu of gas produced get too low or high, and an alarm is also sounded if liquid pumps or the direct fired heater shuts down.

The 5,800,000-gal low pressure-low temperature storage constructed this spring and summer have nearly doubled the company's storage capacity. We now have adequate propane liquid in storage to provide 80% of the peak shaving gas required during a record cold winter. The peak shaving plant added to our system this year, along with our other five peak shaving plants gives us a total mixing capacity of 1400 Btu propane-air gas equivalent to 6,500,000 cu ft of 1000 Btu natural gas per hr.

Long range planning caused the Dakota County Propane Station to be designed and constructed with future requirements in mind. Space is available for three more 5,800,000-gal low temperature tanks. The holding refrigeration building is sized large enough to house holding compressors needed for another tank. Connections are provided that will allow the filling of another tank using the present equipment. Ample space is available for future peak shaving facilities. Two additional vaporizers and six more compressors will probably be installed in the near future, giving a total capacity of 1400 Btu propane-air equivalent to 2,250,000 cu ft of 1000 Btu natural gas per hr.

## Design of Storage Vessel

The storage vessel is a cylindrical, double-wall, flat bottom tank with a self-supporting dome roof. Water capacity is 120,000 bbl; this quantity at the storage temperature of −52 F is equivalent to about 5,600,000 gal of propane at 60 F.

The inner tank is 101-ft, 2-in. in diameter with an 84-ft high cylindrical shell. The outer tank is 106-ft, 2-in. in diam. Considerations in the design of the storage tank included low temperature steel and welding specifications, testing of steel and finished welds, manufacturing and welding techniques, and stress-strain levels of all components. Steel plate selected for the inner tank was A201-Grade B Firebox rolled to ASTM A-300 specifications. Normalizing heat treatment and impact testing of each plate as rolled was required. Charpy impact values of 15 ft-lb at −55 F were required. Design pressure of the inner tank is 1 psig. Design rules set forth in API Standard 620 were considered as minimum requirements.

The inner tank was filled with water to a height of 81 ft and pressurized to 1.25 psig. for the pressure test and leak tested with soapsuds. Both inner and outer bottoms were leak tested with a vacuum box. The outer tank was independently pressurized to 4-in. wc pressure and leak tested with soapsuds.

The outer tank completely encloses the inner tank and the gas tight space between tanks contains the insulation. This annular space is pressurized with nitrogen and maintained at slight positive pressure. A separate 10,000 cu ft vapor tank with a weighted reinforced neoprene curtain provides a breathing device which "rides" on annular space pressure. As changes in ambient temperature and barometric pressure cause expansion and contraction of contained nitrogen, the vapor tank diaphragm moves up and down to maintain positive pressure in the insulation space.

Between inner and outer roofs and shells, the distance is 2 ft, 6-in. This space is filled with granular perlite with a thermal conductivity of

$$0.25 \frac{\text{Btu in.}}{\text{hr ft}^2\ \text{F}}.$$

An initial nitrogen purge displaces air in the space leaving a dry and inert gas atmosphere. Heat transfer by convection in this system is relatively minor because the fine perlite provides considerable resistance to gas flow. No corrosion of steel in the space is anticipated. A 15 in. thick slab of load bearing insulating concrete separates the inner and outer steel bottoms. The outer bottom rests on a concrete slab that is supported by concrete piles. An air space of about 1 ft., 6-in. remains between finished grade and the under side of the concrete slab. This space is left open on the periphery so that warm air may circulate under the slab by natural convection. Water, cast-in-place concrete pilings bearing on rock strata 18 feet below the surface were used because soil borings revealed clay lenses and subsoil water. This type of construction makes unnecessary the use of heating pipes or cables below the tank bottom to prevent migration or freezing of subsoil water.

Expansion joints are provided at all piping connections to the tank to insure adequate flexibility in the piping

system and to protect against induced stress resulting from relative movement of inner and outer tanks.

### Design of Refrigeration Plant

Normally, the storage vessel will be filled during summer months. Commercial propane containing from 1 to 6½% ethane and produced to comply with the NGAA maximum vapor pressure, moisture content and residue requirements is obtained from local refineries or from the Mid-America Pipe Line. Initially, all product was delivered to the station by truck and unloaded into the battery of ten 30,000-gal full pressure blimps. The rate of truck unloading is as high as 5000 gal per hr.

The stream from the blimps passes through a desiccant dryer for removal of absorbed water before entering the refrigeration equipment. The presence of water molecules could cause hydrates to form in vessels operating at high pressures and low temperatures. The refrigeration plant is designed to cool down an incoming 90 F stream to a storage temperature of approximately –52 F at a rate of 5000 gal per hr.

Of the many different refrigeration cycles and refrigerants that could be used in this application, operating economies and the necessity of handling ethane-rich vapors prompted the use of a cascade system. Commercial propane is first flashed down to +20 F before being expanded directly into the storage vessel, where it flashes further to the storage temperature of –52 F.

Vapors withdrawn from the storage vessel are compressed to 75 psig in a two-stage compressor and discharged into a vessel where they are mixed with +20 F liquid flashed from the incoming stream. This completes a separate vapor compression cycle in which the storage tank serves as the evaporator.

The condensing medium for the commercial cycle is pure propane maintained at +7 F in another evaporator by a pure propane vapor compression cycle. Pure propane vapor is withdrawn from this evaporator, compressed in a single stage machine, discharged to an evaporative condenser operating on induced air draft and a water spray, and the condensate expanded back to the evaporator.

For simplicity and compactness, a single combination vessel was designed to function as the pure propane evaporator and the initial flash tank for incoming commercial propane compressor. This is merely a vertical shell-and-tube heat exchanger with fixed tube sheets. The pure propane evaporator is the tube side. The commercial propane is flashed on the shell side and commercial propane vapor from the flash and from the compressor discharge are condensed on the shell side.

Because of the variable composition of the product, and so that low compression ratios consistent with economical sizing of compressors and low operating costs may be used, a purger is included. Function of the purger is to maintain a maximum pressure of 75 psig in the shell side of the combination vessel. When the ethane content is so high that all of the vapor will not condense at the shell side temperature and pressure, the excess is bled off to the purger where it normally can be condensed at 75 psig and approximately –35 F.

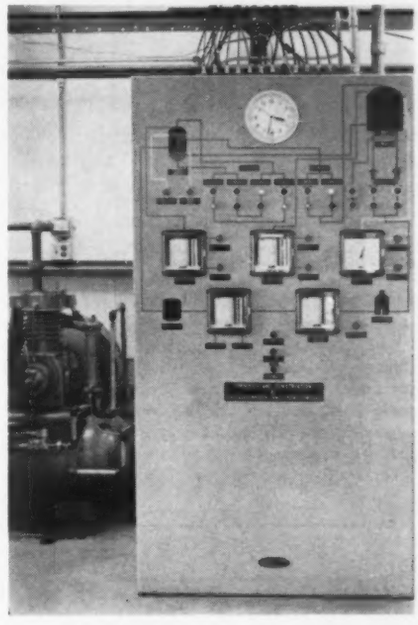
The purger is also a vertical shell-and-tube heat exchanger. The tube side is the low temperature evaporator. Commercial propane liquid at +20 F is taken from the combination vessel and expanded to near atmospheric pressure at –52 F. The flashed and boiled vapor is discharged from the purger into the compressor suction line from the storage vessel. Warm non-condensed commercial propane vapor from the combination vessel flows to the shell side of the purger where most of it can be condensed at approximately the same pressure as the combination vessel but at a far lower temperature. This condensate is discharged from the purger into the fill line to the storage vessel.

Any gas or vapor that cannot be condensed in the purger is vented from the shell side to an automatic flare and burned. Such vented gas at the purger temperature and pressure is high in non-condensables and low in propane content so that the loss of propane is kept to a minimum.

Separate compression and condensing equipment is installed for filling and holding refrigeration. Normally, most of the filling will be accomplished during the summer months. During the remainder of the year only sufficient refrigeration capacity to hold the stored product at –52 F is required. The holding duty includes heat leak into the storage tank and connected piping, and, indirectly, whatever purging duty required when this equipment is operating. The maximum holding duty in the hottest weather is only approximately 10 tons of refrigeration.

A small commercial propane compressor and a pure propane compressor with direct connected electric motor drives are installed for the holding requirement. A small air-cooled condenser requiring no water supply is used to condense discharge from the high stage holding machine. Also, a small separate combination vessel is installed for holding only to provide a means for stand-by holding refrigeration should the large combination vessel be out of service for maintenance or other reasons.

Desiccant dryer and its control panel (foreground) can process up to 5000 gal per hr. At rear is direct fired heater that can raise 400 gal per min from —52 to +40 F.



Process control panel is in control building. Air compressor at left supplies instrument air for control system.

In event of electric power interruption, a stand-by electric generator with gas engine drive will furnish power for the holding machines, the air-cooled condenser, and the instrument air compressor and area lighting.

The commercial and pure propane compressors used for filling refrigeration are each driven by natural gas engines. The cost of natural gas fuel is several times less than the cost of electric power that would be required if the compressors were driven by large electric motors. During the filling period the

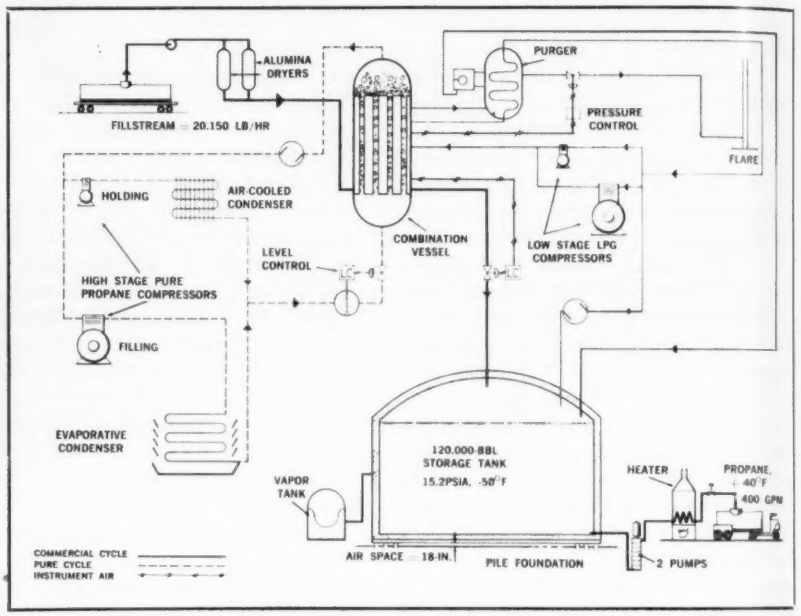
compressors are operated on a 24-hr basis at full capacity for weeks at a time. The filling compressors are also equipped with automatic capacity control and can serve as a stand-by for the holding compressors.

All pipe and fittings operating at low temperatures are constructed of impact tested materials. Foamglas insulation is used on piping and vessels other than the main storage vessel. An aluminum jacket provides the external vapor barrier.

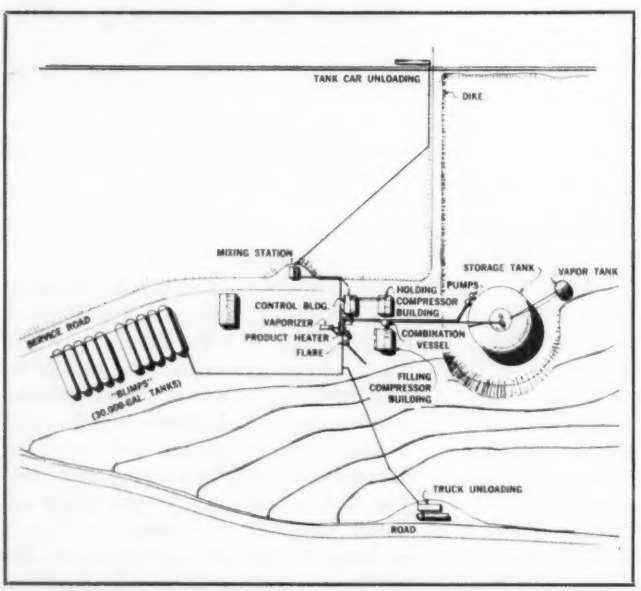
**Product Dryer**

Cobalt bromide dryness tests taken on delivered product during the summer of 1961 indicated moisture contents well within the NGPA specification. Some water is expected occasionally, however, and the presence of water molecules would invite formation of hydrates — particularly at low spots in the piping system, areas of high turbulent flow, and at zones of relatively high pressures. A desiccant dryer installed in the main fill line eliminates these problems. The dryer operates on a continuous basis with a semi-automatic regeneration cycle. Alumina is used as the desiccant and a natural gas burner furnishes the heat for regeneration. The design rate is 5000-gal per hr with the moisture content of discharge not to exceed 20 ppm. The dryer is intended to remove only adsorbed-water, not entrained water. Product is removed from the 30,000-gal pressure blimps through a dip pipe extending down from the top to within

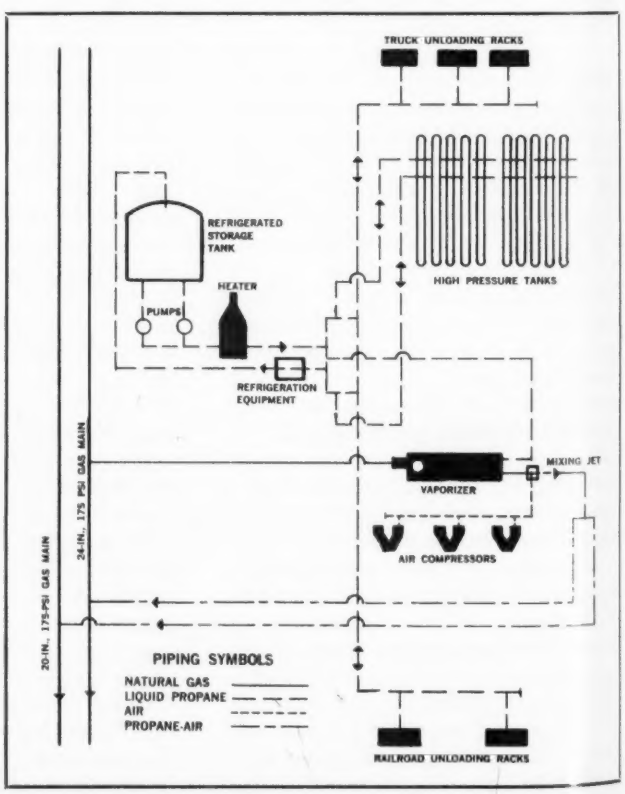
American Gas Journal editor Dean Hale inspects key control system equipment atop the storage tank. Pressure transmitter (lower left) relays storage tank pressure to process control panel. This pressure controls the automatic filling valve, high and low pressure alarms, vapor replacement, and commercial propane compressors. Differential pressure transmitter (center) measures hydraulic head inside tank and transmits signal to process control panel where tank volume is registered in percent. Mr. Hale's hand is on the vacuum pressure vent connected to the inner storage tank.




Flow diagram of refrigeration process.




Plant layout of Dakota Station. Truck unloading is at top of high bluff (botom of drawing).




Piping plan of propane-air plant, including refrigerated storage facility and air-gas mixing facilities.

one or two inches of the bottom invert of these horizontal vessels. This provides a means for water to settle out in the very bottom of the blimps. It can be drained occasionally through dip tubes that extend to the bottoms of the blimps. To prevent freezing of such water, a small quantity of alcohol is added to the blimps when they are first placed in service and occasionally thereafter, depending on sample testing at the bottom blow-off valves.

### Heat-Up and Pump-Out

Removal of product from the flat bottom storage tank presents special design requirements. In order to completely empty the tank, which is at near atmospheric pressure, it is necessary to provide a pump capable of operating on a very small NPSH. Further, it is imperative for this low available suction head that the product does not warm up in transit from the tank to suction of the pump. Such a change in temperature would be accompanied by an increase in vapor pressure at suction and this would detract from the available head.

Two 200 gpm vertical deep well centrifugal pumps were selected and placed within 10 feet of the storage vessel. Vent lines from suction and discharge of the pumps vent back to the storage vessel any vapor formed in the pump. This is a means of maintaining the pump in a refrigerated condition. By-pass valves are installed to limit discharge pressure and protect against pump over-heating. The pumps are also interlocked electrically with the heater controls.

A direct-fired heater with capacity to heat up the 400 gpm stream of propane from –52 F to +40 F is installed downstream of the pumps. It is especially important that cold product does not pass on to the conventional piping, blimps, trucks, railroad cars and vaporizer, as these components are not constructed of low temperature impact tested materials. Natural gas is used as fuel for the heater. The burner is modulated by product discharge temperature. A by-pass in the pump-out line is provided for start-up and shut-down so that product discharge temperature can be controlled within the range of burner control response. For the short periods when the burner is catching up or throttling back, product that is too cold will be by-passed back to the main fill line to be recirculated. This provides a means of maintaining more uniform discharge pressure on the pumps and a near constant discharge temperature from the heater.

During winter peak shaving operation, the warm liquid from the heater discharges to the propane vaporizer operating at approximately 200 psig.

### Automatic Control and Plant Operation

The control system is designed to provide for complete automatic operation of both filling and holding refrigeration. Pneumatic control components are used as transmitters, controllers and automatic valve actuators.

On the main control panel the following are recorded on strip-chart recorders:

pressure in the storage vessel;
pressure in the tube side of the combination vessel (evaporator pressure for the pure propane cycle);
liquid level on the storage vessel:
incoming flow rate;
pump-out rate, and
heater discharge temperature.

A temperature recorder located near the storage vessel records temperature of product in the storage vessel.

Warning lights on the control panel indicate high and low pressure in the storage vessel; high and low liquid level in the storage vessel; high pressure and low liquid level on the tube side of the combination vessel; high pressure and high liquid level on the shell side of the combination vessel; high and low temperature at heater discharge.

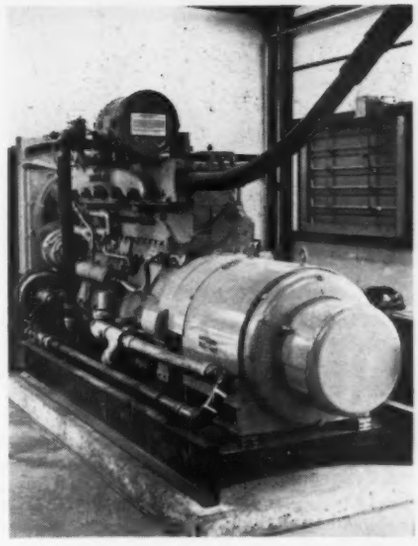
Automatic vent valves are provided on condenser receivers to relieve abnormal high pressure vapor to the flare. Automatic valves control the vent gas flow from the shell side of the combination vessel to the purger and from the purger to the flare.

All process vessels and compressors are equipped with spring loaded safety relief valves set at design pressure. Discharge of most of these valves is piped to the flare header. Hydrostatic relief valves are provided between shut-off valves in all liquid pipe lines.

Weight-loaded pallet-type pressure vacuum vents are installed on the inner and outer tanks of the storage vessel.

Incoming flow rate is controlled by a set point on the controller operating on storage tank pressure. The tank is normally filled at maximum rate at a pressure of 0.5 psig. As tank pressure deviates from this set point, a signal is transmitted to an automatic valve between the dryer and the combination vessel and flow is regulated accordingly. A flow meter in this line transmits to a flow recorder on the panel to indicate flow rate. This automatic valve throttles the stream to fill at maximum rate consistent with maintaining constant pressure in the storage vessel.

Should it be desirable to limit the fill stream, capacity control is provided in the filling compressors. The storage vessel pressure controller sends a signal to a pneumatically operated control panel located at the compressor. At predetermined set points the commercial filling machine will unload both by stepwise unloading and speed control. The commercial propane compressors are set to turn on and off at pressures set on the storage vessel pressure controller.



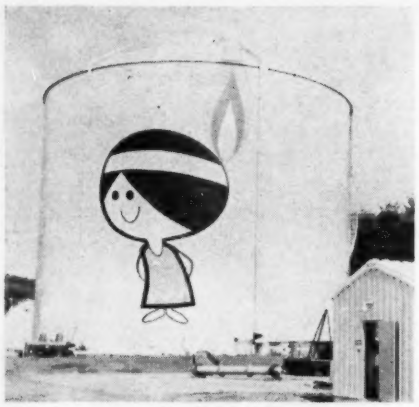
Standby generator in control building is driven by natural gas fueled engine.

The pure propane cycle is controlled by a similar means. A transmitter on the tube side of the combination vessel transmits to a recorder and controller on the panel. The pure compressors are energized at definite points. The pure cycle receives its duty from the commercial cycle, and this duty varies considerably with ambient temperatures, purger operation, and composition of the product. Therefore, it is necessary to have this independent control. The pure propane filling compressor also has all-pneumatic capacity control that is operated by this controller.

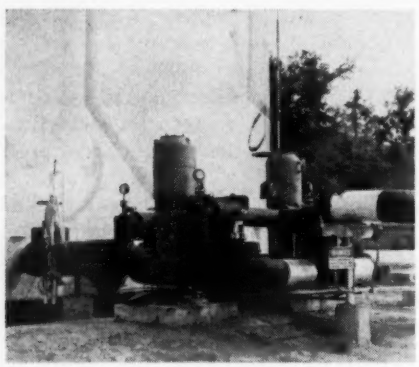
The main control panel is equipped with manual "on"-and-"off" switches and hand knobs so that the entire system may also be controlled manually from the main control panel. Temperatures and pressure indicators are provided at all critical points in the refrigeration cycles, at pump suction and discharge, at the dryer vessels and at the heater.

The filling commercial and pure propane compressors have their own control panel as indicated above. On this panel, horns and pneumatic flags indicate a variety of possible malfunctions for gas engines and compressors, such as low oil pressure, high discharge temperatures, high speed and high liquid level in entrainseparators.

The stand-by electrical generator is equipped with an automatic transfer switch that provides for unattended switchover to stand-by power for the



"Minnegasco" keeps a watchful eye on the Dakota Station plant from her post aside the 120,000-bbl refrigerated storage tank. The Minneapolis Gas Company symbol is painted in bright colors and visible for miles. Tank is painted a light pastel blue. Along grade line near bottom of tank, left to right, are the nitrogen vapor tank, two pumps used for product removal, and the holding compressor building.



Twin 200 gpm vertical centrifugal pumps connected to bottom outlets of refrigerated storage tank are used to remove LPG and move it to the direct fired heater. Pumps are interlocked electrically with the heater.

instrument air compressor, holding compressors and condenser.

Set points will probably be changed occasionally on the tank pressure controller to maintain optimum control conditions. During the spring of the year, rather drastic changes in barometric pressure may occur and it will be desirable to operate the holding machines over a wider pressure range. The variation in barometric pressure may be as much as 0.25 psig over a short period of time.

If the storage temperature corresponds to a sufficiently low pressure, the holding machines will handle normal heat leak and still have a sufficiently broad pressure range in which they alone will operate. During this condition, gage pressure in the storage vessel will never reach the high set point, which would automatically turn on the large filling machines. The filling machines are set to operate any time pressure becomes excessive in the storage tank. Short time operation of the large machines, however, should be kept to a minimum because of associated higher operating costs.

Pump-out and heat-up facilities may be initiated from the control panel by push button action of pump starters and heater ignition. Unattended continuous pumping and heating can be achieved by proper adjustment of set points.

## Plant Layout

A dike system around the storage vessel was designed by Minnegasco. The tank is placed very close to a bluff, the top of which is very nearly at the same elevation as the top of the tank. Natural grade at the bottom of the bluff slopes off rather rapidly into a broad valley, at the bottom of which is a navigable river. An earthern dike on two sides of the tank will divert any spilled product down the inclined grade into a large diked ponding area quite remote from the tank. This arrangement has the advantage that a spill either from the tank or connecting piping will quickly drain away to the pond area, which is sufficiently far away so that, if ignited, the tank would not be in the center of the fire.

The combination vessel area is approximately 250 ft away from the tank in a direction parallel to the fall line of the bluff. Immediately adjacent and on opposite sides of the combination vessels are the condensers and compressor buildings.

One building houses the holding compressors with their entrainment and oil separators and local control boards. All equipment in this building is explosion-proof. The other compressor building contains the gas engine driven compressors with their associated control panel and accessories. This building has large roll-up doors on three sides that automatically open when the compressors start. All controls are pneumatic in this building and electric lights and door operators are explosion-proof. The gas engines cannot be considered as completely explosion-proof. This building, however, is well ventilated and is approximately 100 ft away from the holding compressor building.

The control building is located an additional 150 ft further back from the combination vessel and compressor building area. It houses the main control panel, the motor control center containing starters for all electric motors in the plant, transformers, control relays, etc. Also in this building is the stand-by electric generator and the instrument air compressor. Because of its remote location this is classified as a less hazardous area and not all equipment is explosion-proof.

The dryer and direct-fired heater are located at about the same distance back from the compressor buildings as the control building but this area is about 200 ft away from the control building in a direction perpendicular to the bluff. The flare tower is also located in the dryer-heater area.

Pipelines and instrument control lines are carried down centrally located racks that are at an elevation of approximately 4 ft above grade for ease of inspection, maintenance, fittings, and reading of pressure and temperature gages.

Fire fighting and safety equipment is installed at strategic locations in the plant area. During initial start-up large movable blowers were placed around vessels and compressors to dilute any unexpected gas leaks or liquid spills.

## Initial Start-Up

Extreme care was exercised in cleaning and drying the vessels and pipelines. The storage tank and piping was purged with nitrogen and the nitrogen was subsequently displaced by propane vapor. Sufficient drain and blow-down valves discharging to the flare header were installed so that purging could be accomplished cautiously in a step-by-step manner. End points of purging were monitored continuously with gas analyzers. The plant area was periodically checked for explosive mixtures that might result from leaks at valves or other equipment.

The nitrogen-propane mixture was withdrawn from the tank, a large portion of the propane condensed, and this condensate returned to the tank to flash and vaporize. A considerable amount of venting from the shell side of the combination vessel was required until the nitrogen content was reduced to approximately 1%. Vent gas was passed through the purger and on to the flare.

This procedure provided a means of simultaneously purging and cooling down the storage tank. Liquid at –53 F was finally accumulated on the tank bottom at approximately the same time as purging was complete. The rate of purging and cool down was regulated by manual operation of compressors to provide a fairly uniform cool down of the steel tank. To monitor the steel place temperatures, a multi-point temperature recorder was used which read each of 10 thermocouples installed on the inner tank roof, shell and bottom.

As vapor was withdrawn from the tank and cool down progressed, propane was admitted through the fill line to the combination vessel at a rate which would maintain storage tank pressure. At completion of cool-down, filling was continued as rapidly as possible. The plant was then placed on automatic control, adjusting variables in each control loop in a logical sequence. ★ ★ ★

# Continuing Customer Opinion Survey Aids CG&E's Community Relations

**Jerry Hurter,** *Cincinnati Gas & Electric Company, Cincinnati, Ohio*

George J. Kuehnle, Jr., vice president in charge of community relations for Cincinnati Gas & Electric Co., and his assistant, Chester Hodges, discuss action to be taken on a customer's suggestion made in company's continuing customer service survey.

Easy-to-use, self-addressed, stamped, and return-addressed questionnaire form is key to continuing survey. Demonstrating how the form folds up for mailing is Mrs. Marilyn Mattlin, CG&E community relations department.

**Cincinnati Gas & Electric Company has come up with a new and different method of keeping its finger on the pulse of its customers.** As the result, the company is now able to have an up-to-the-minute knowledge of what its customers think of its service.

A novel, simple, and amazingly inexpensive type of a continuing survey is made daily. Any change in customer opinions of the company are noted and acted upon immediately.

**The survey is done entirely by mail.** No return envelopes are required by the customer. The simple questionnaire is individually typed and addressed back to the company. All that is required on the part of the customer is to check off the answers to the questions, add any comments he sees fit, sign it and drop it in the mail. A small sticker, about the size of a quarter, is used to fasten the fold. The outer side of the folded questionnaire bears a 4-cent stamp. A different color folder is used for each division of the company.

Approximately 5% of all trouble calls are mailed questionnaires each day. The average is about 50 electric and 36 gas calls daily. Cost of the survey is limited to postage (about $35 a week) plus the cost of paper and printing. The latter cost is negligible as the questionnaire measures only seven by ten inches.

Mailing and tabulating of the returns is done by two girls in the community relations office. Each complaint is followed by a personal interview by a company representative. Response to the original test survey, made from October 1, 1959 to September 30, 1960, exceeded all expectations. It prompted CG&E officials to make it a continuing project.

Previously, the company had relied upon a survey made by a nationally known organization bi-annually.

**George J. Kuehnle, Jr., vice president in charge of community relations, developed the new method.** Here's how it works:

During the test period, letters were

**THE CINCINNATI GAS & ELECTRIC COMPANY**
CINCINNATI, OHIO

**SERVICE CALL APPRAISAL**

1. HOW PROMPTLY WAS YOUR REQUEST ANSWERED?
   - Unusually prompt ☐
   - In reasonable time ☐
   - Slow ☐

2. WERE THE CG&E PEOPLE YOU CONTACTED IN THIS MATTER COURTEOUS?
   - Very courteous ☐
   - Reasonably courteous ☐
   - Discourteous ☐

3. WAS THE MATTER HANDLED COMPLETELY AND TO YOUR SATISFACTION, OR NOT?
   - Completely satisfied ☐
   - Some minor details remain unsatisfactory ☐
   - Seriously incomplete or unsatisfactory ☐

4. WOULD YOU CARE TO MAKE ANY OTHER COMMENTS OR ASK ANY QUESTIONS ABOUT THIS MATTER, OR ABOUT GAS AND ELECTRIC SERVICE, IN GENERAL?

COMMENTS AND QUESTIONS:

NAME _____ ADDRESS _____

Sample of survey form used to obtain customer's opinion of service call.

THE CINCINNATI GAS & ELECTRIC COMPANY
CINCINNATI 1, OHIO

Recently, our representative called on you in connection with a gas service problem. We value our customers' opinion; and so are anxious to know if this matter was settled to your complete satisfaction.

Would you please take just a moment to check your answers to the questions on the enclosed sheet, as they apply to your recent problem. Then merely fold it, seal it, and drop it in the mail . . . a 4¢ stamp is attached.

Thank you.

Yours very truly,

Chester Hodges
Community Relations Representative

Enclosure

Cover letter for survey form.

sent to persons who recently had placed gas or electric trouble calls to the company. A check-off sheet requesting answers to the following questions was enclosed:

1. **How promptly was your request answered?**
2. **Were the CG&E people you contacted in this matter courteous?**
3. **Was the matter handled completely and to your satisfaction, or not?**
4. **Would you care to make any other comments or ask any questions about this matter, or about gas and electric service in general?**

Response to the questionnaire exceeded all expectations. A total of 2443 replies was received from the 3760 persons contacted during the test survey period. This was 64.9% return.

Of the 2443 who replied, 2332 said they were completely satisfied, 96 said some minor details remained unsatisfactory, and only 15 said they were dissatisfied.

A total of 2245 said CG&E service people were "very courteous", 192 said "reasonably courteous", and four "discourteous."

The vast majority — 1589 — said the request for service was answered "unusually prompt," 818 said "in reasonable time," and 36 said "slow."

**Here are some of the typical comments from customers:**

- "I admired the competence of the serviceman who worked on the meter. I also admired his attitude, especially after having been taken out of bed at two o'clock in the morning."
- "If all service people were as courteous as the man who came here to take care of our trouble, this would be a wonderful world to live in. Also want to comment he was here in five minutes, I'd say that's excellent. Sorry I wasn't as prompt in sending this in. Sorry."
- "The meter reader has been particular nice to our dog and has won her over. This is beyond the call of duty and we appreciate it very much."
- "I have always been very pleased with the service of your company. When you break your gas and electric bill down to the amount spent daily for gas and electric, I can think of nothing else that gives you as much value as the money spent on gas and electric."
- "If all utilities were as satisfactory as our gas service, life would be heavenly. Gas is the most satisfactory and least expensive of any commodity we buy. Thanks."
- "Ordinarily my husband could take care of the situation we had but since he was in the hospital at the time, it was wonderful to call the Cincinnati Gas & Electric Company and have our service returned so promptly."
- " 'Very courteous' is still not ample to describe attitude of servicemen. Men were quite insistent in their efforts to do all that was possible."
- "We have always been impressed by your efficient service."
- "There just isn't enough praise for your company — always prompt and courteous no matter what."
- "The service man was here within a few minutes — and was so nice."

**One comment pointed up the fact that the customer sometimes blames the meter reader when his gas bill is high.**

- "My gas bill is always so high . . . I would like a different meter reading man," wrote the customer.

"By and large we are proud indeed of the results of the customer service survey," Ernest S. Fields, CG&E president, states. "Our service men also share in this pride. Importance of prompt, courteous service cannot be over-estimated. We should all remember that our customers judge our company by our individual attitudes toward them." ★ ★ ★

# Compact Trucks Prove Successful

**Ten "economy model" trucks** will soon be making the rounds in various divisions of Southern Counties Gas Company as result of a successful five-months trial of a Chevrolet Corvan by the utility's San Gabriel Valley division.

The Corvan, first compact truck purchased by Southern Counties, was operated on an experimental basis by service mechanic Norv Steele. The economy vehicle proved ideal for keeping materials and expensive tools, such as those used in air conditioning work, under lock and out of the weather.

Success of the Corvan led to orders for nine similar models for use by other service mechanics, servicemen, and metermen in other divisions of the company.

The new compact trucks will become standard equipment for the service mechanics. Five Corvans will be assigned to the utility's Orange County, Eastern, Harbor, Santa Monica Bay, and Northern divisions.

In addition, four more trucks are planned for trial by servicemen and metermen. One is a Ford Econoline Van to be equipped for a serviceman and assigned to Santa Monica Bay division. A Corvan will be equipped for service work and assigned in San Gabriel Valley division.

Two other units, for trial use by metermen, include an Econoline pickup model for use in Orange County division and a Corvair pickup model for use in Southern Counties' Eastern division.

**Panel model Corvan truck** keeps material out of the weather and "under lock"; inside, tools and materials can be kept safely and neatly . . . such as this bin for filters for gas air conditioners.

**Southern Counties Gas Company service mechanic Norv Steele** points to rear engine arrangement of this compact truck model. Steele tested unit "on the job" for five months, proved it practical. Company is adding nine similar models to its fleet.

# Distribution Contractors Association Formally Organized, Membership Growing

**Dean Hale,** *Editor*

**Gas distribution contractors** — who, collectively, install nearly one-half of all the gas distribution mains and services installed in the nation each year — have formally organized their own association: Distribution Contractors Association.

By the very nature of their work, involving smaller diameter pipe and lower pressures (as contrasted to work done by their contemporaries in the mainline pipeline contracting field), the distribution contractors have long needed such a nation-wide organization.

Meeting in Kansas City in August, representatives from 30 gas distribution contracting firms approved a charter and bylaws for the new DCA. Of the firms present, 26 became charter members and four reserved committments until later. All of those present approved the association's goals and plans.

By mid-September, the list of members had grown to 35, with two associate members enlisted and many other firms — both contractors and suppliers — indicated interest in becoming members of the new association.

The DCA is seen as meeting an urgent need in the vast gas distribution industry. Much of the construction involved in the tremendous expansion of the distribution industry during the past decade has been performed by contractors. The outlook for the coming decade is even bigger. Better recognition for their efforts and establishment of professional standards are seen as some of the tangible benefits for the distribution contracting firms participating in the DCA.

**Purposes of the Distribution Contractors Association** are well defined in the organization's bylaws:

"To serve as a medium of exchange of information among contractors engaged in the construction of distribution pipelines through the United States."

"To make membership in the Association a reasonable assurance to the public of the skill, integrity, and responsibility of its members."

"To maintain the standards of the distribution pipeline construction business at the level necessitated by its quasi-professional character and to establish members of the Association in the public mind as contractors who fulfill obligations in good faith."

"To promote more cordial and cooperative relations among individuals and firms engaged in the construction of distribution pipelines."

"To encourage efficiency among distribution contractors and their employees."

"To seek correction of injurious, discriminatory, and unfair business methods practiced by or against distribution contractors.

"To eliminate as far as possible the occurrence of injury and death to employees of distribution construction firms.

Formal organization of the DCA culminated many months of effort by representatives of many of the leading distribution contracting firms. Informal discussion of the distribution contractors' problems and the need for such an association led to the formation of an organizational committee headed by Emerson H. Clark, vice president of Engineering-Construction Company. The committee's work was climaxed in Kansas City with establishment of the DCA.

Officers of the DCA, elected at Kansas City, include: President, *Emerson H. Clark,* Engineering-Construction Company, Tulsa, Oklahoma; first vice-president, *W. C. Donaldson,* Underground Constructors, Inc., Dodge Center, Minnesota; second vice-president, *A. T. Everham,* Midwestern Contractors, Inc., Wheaton, Illinois, and treasurer, *Don W. Miller,* Don W. Miller, Inc., Green Springs, Ohio. The officers named also serve on the board of directors.

Other directors named include *Deane Baker,* Somerville Construction Company, Ada, Michigan; *Robert Burkhardt,* Burkhardt Pipeline Construction Company, Avon Lake, Ohio; *F. E. Everett,* Mid-Mountain Contractors, Inc., Bellevue, Washington; *M. L. Hulcher,* M. L. Hulcher Company, Inc., Virden, Illinois; *B. M. Laulhere,* Hood Corporation, Whittier, California; *R. E. Reutzel,* R. E. Reutzel Company, Inc., Fremont, Nebraska, and *I. C. Russell,* Russell Construction Company, Morganfield, Kentucky.

## Officers and Directors of the DCA

E. H. Clark
President

W. C. Donaldson
1st Vice Pres.

D. W. Miller
Treasurer

R. W. Burkhardt
Director

F. E. Everett
Director

B. M. Laulhere
Director

W. F. Muncie
Director

R. E. Reutzel
Director

I. C. Russell
Director

Nine new member companies have been added to the original list of 26 charter member contracting firms, and the association has an informal goal of 50 or more members by the first of the year.

At the charter meeting, two important committees were established — a labor committee and a membership committee. Deane Baker was named chairman and I. C. Russell vice chairman of the labor committee. Chairman of the membership committee is John E. Baker of Engineering-Construction Company, who has been active in organization of the DCA and serving as secretary *pro tem* of the association.

Headquarters for the Distribution Contractors Association will be in Tulsa, Oklahoma. An executive secretary to manage the DCA office and conduct its affairs will be named in the near future, according to DCA president Clark.

First annual convention of the Distribution Contractors Association is slated for Kansas City, Missouri sometime during February 1962.

While the Distribution Contractors Association and the Pipe Line Contractors Association (the mainline, big-inch pipeline contractors' organization) will work closely together on common interests, the two groups will be independent and maintain separate activities. Some member firms of the DCA are also active in mainline construction work and are members of both groups.

Here's a list of the DCA member companies (* indicates charter member):

**Regular Members**

The Banister Corp., St. Paul, Minnesota
Beloit Pipe & Dredge Co., Inc., Beloit, Wisconsin*
Burkhardt Pipeline Construction Co., Avon Lake, Ohio*
Campion Pipeline Construction Co., Inc., Minneapolis, Minnesota*
H. M. Cook Pipeline Construction Co., North Salt Lake City, Utah
Richard N. Crum Corp., Grafton, Ohio
Engineering-Construction Company, Tulsa, Oklahoma*
Gabe's Construction Co., Sheboygan, Wisconsin*
Geneva Construction Co., Aurora, Illinois
Hood Corporation, Whittier, California*
M. L. Hulcher Co., Inc., Virden, Illinois*
Industrial Maintenance, Inc., Lansing, Michigan*
M & M Pipeline Construction Co., Inc., Moline, Illinois
L. G. Massart Plumbing and Heating Co., Seattle, Washington*
Michels Pipe Line Construction, Inc., Milwaukee, Wisconsin
Midland Constructors, Inc., Chicago, Illinois*
Mid-Mountain Contractors, Inc., Bellevue, Washington*
Midwestern Contractors, Inc., Wheaton, Illinois*
Don W. Miller, Inc., Green Springs, Ohio*
P. L. Murphy Construction Co., Inc., Dwight, Illinois*
Northern Underground Constructors, Inc., Dodge Center, Minnesota
Pipeline & Station Construction Company, Oswego, Kansas*
Poling & Bacon Construction Co., Inc., Youngstown, Ohio*
R. E. Reutzel Co., Inc., Fremont, Nebraska*
Russell Construction Co., Morganfield, Kentucky*
Shamrock Construction Company, Lansing, Michigan
Sommerville Construction Co., Ada, Michigan*
Sommerville-Illinois Co., Peoria, Illinois*
Underground Constructors, Inc., Dodge Center, Minnesota*
Universal Pipeline Constructors, Inc., Kansas City, Missouri*
Utilities Service Co., Ellsworth, Kansas*
Van Ess Co., Grand Rapids, Michigan*
C. E. Wilson Construction Co., Leawood, Kansas*
Wirt & Starn Inc., Wooster, Ohio
A. P. Young Contracting Co., Kansas City, Missouri*

**Associate Members**

Midwestern Engine & Equipment Co., Tulsa, Oklahoma
Tulsa Equipment Co., Tulsa 9, Oklahoma

* * *

**Northern Illinois Gas' fleet** of nearly 1700 units is made up of a great variety of vehicles.

# Twice Around The World

***Transportation equipment – trucks, tractors, trenchers, passenger cars – plays a big role in the modern gas utility's operations; here's a case history study on one company's equipment and costs . . . for a fleet that travels . . .***

***Henry W. Keller,*** *Superintendent of Transportation, Northern Illinois Gas Company, Bellwood, Illinois*

*Anyone who has driven the approximately 2000 miles from Chicago to the West Coast will agree that it's a long trip.*

Northern Illinois Gas Company vehicles, during the normal course of business, travel an average distance equal to about twelve such round trips every day, 365 days a year.

Instead of aiming toward the West Coast, however, drivers of these vehicles are aiming for even better service for NI-Gas customers.

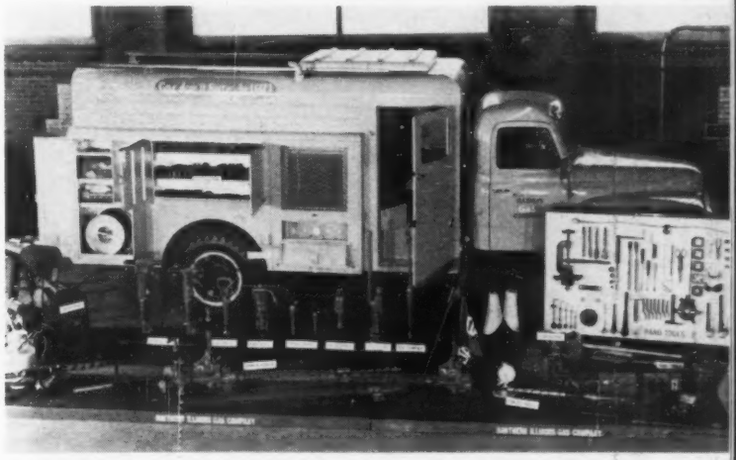
Last year NI-Gas vehicles traveled about 17,340,000 miles — equal to about twice around the world every day. This mileage was racked up only by those vehicles with odometers and does not include the distance traveled by trailers, compressors, welders, and most trenchers. Practically all of this travel was within the 10,000-sq-mile, 20-county area in northern Illinois served by the company.

**Total operating costs and overhead for 1960,** including depreciation, taxes and the like, were close to $2.7 million. This figure also includes the cost of about 1,700,000 gal of gasoline, 73,000 qt of oil, 2400 tires of various sizes, and 900 inner tubes, as well as state and city vehicle licenses and titles amounting to more than $71,000.

**Modern street truck** has power take-off driven single stage 125-cfm rotary air compressor, which is relatively new to the gas industry. Light weight and compactness of the compressor, used to drive pneumatic tools, allows for more room in the truck. NI-Gas has 12 of these trucks in service. It also has about 190 street trucks of other types with labor saving tools mounted on them.

**New truck** is readied for the road. Final step is to add the familiar NI-Gas decal.

# Every Day



**Street truck** with a five-man cab is shown with a display of tools and equipment it carries for the crew's use.

During the three-year period ending in December 1960, the fleet has grown substantially. The following table reflects some of the major changes:

| | Dec. 1957 | Dec. 1960 | Per Cent Increase |
|---|---|---|---|
| Trucks | 493 | 678 | 37.5% |
| Trenchers | 62 | 84 | 35.5% |
| Bulldozers and End Loaders | 18 | 26 | 44.5% |
| Backhoes | 23 | 46 | 100.0% |
| Compressors and Welders | 33 | 59 | 79.0% |
| Trailers | 50 | 74 | 47.0% |
| Passenger Cars | 568 | 697 | 23.0% |

If all these vehicles were lined up bumper-to-bumper, they would form a gray line about 5½ miles long.

**Much effort is directed toward purchasing standard transportation equipment needs** from dealers in the local areas where the vehicles are used. Exceptions to this general rule are the highly specialized machines and trailers needed, which generally are purchased directly from the manufacturer or its agent.

**Why does NI-Gas need such a large fleet and why has it increased in size so rapidly?**

First, because of the rapid customer growth —

**NI-Gas has been making cost studies** of operating compact cars as compared with standard size passenger cars. Studies have not been conducted long enough to give any definite results. Of 697 passenger cars in its fleet, NI-Gas has about 250 compacts.

**Backhoes** are used for many digging chores. Here, operator uses one of NI-Gas' 46 backhoes to dig trench for main replacement project.

**Work fleet** includes 84 trenchers of all types.

**Special tractor-air compressor rig** equipped with drill is used to drill holes in pavement for certain types of leak survey work.

**Five large tractor-trailer trucks** like this one are used by NI-Gas for hauling storeroom materials.

**This fitter's rig** carries all tools necessary to complete customer's gas service after the service pipe has been installed. NI-Gas has about 430 vehicles in its fleet equipped with two-way radio.

from 598,000 in December 1957, to about 716,000 last December. And this growth continues. The May 31, 1961, figures show more than 733,000 customers being served by NI-Gas.

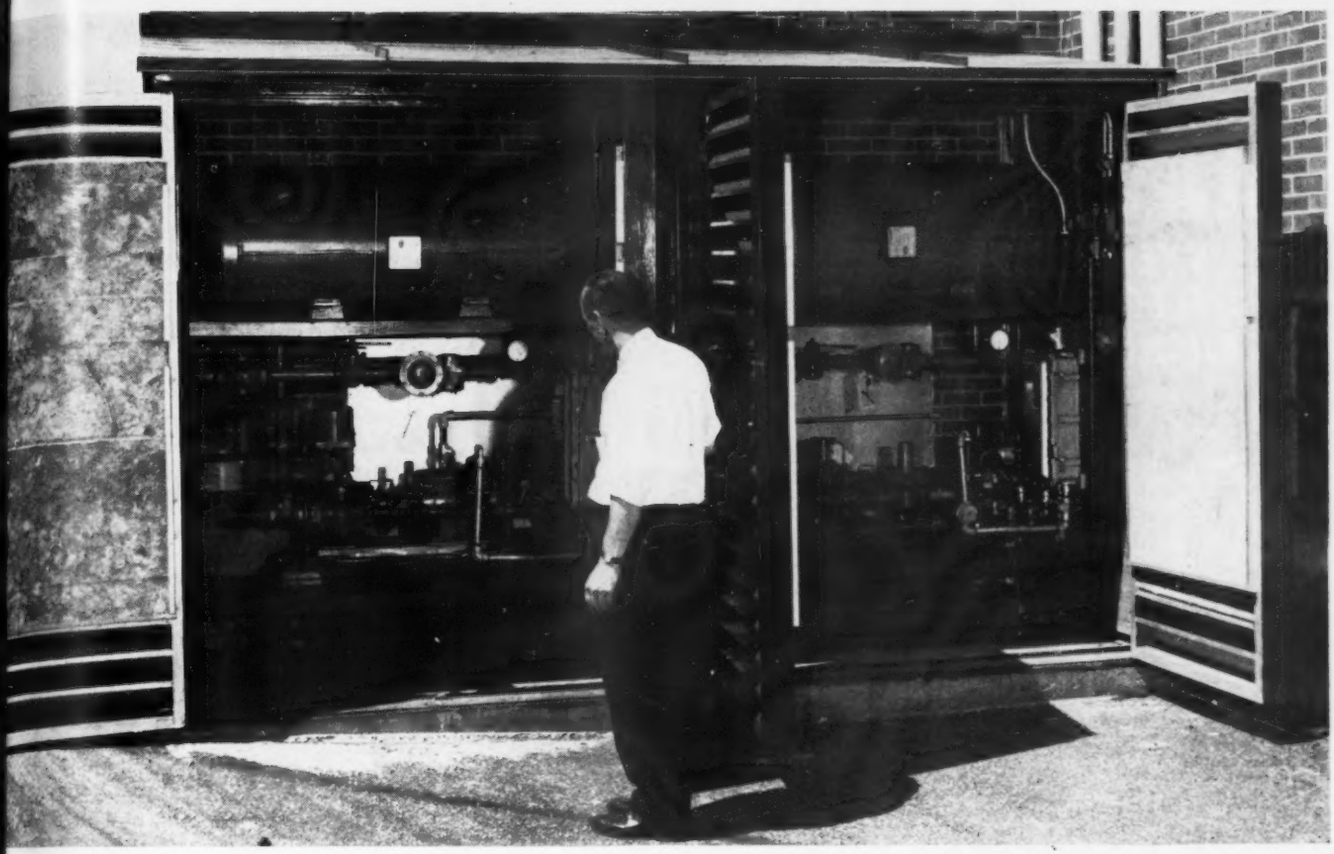
Second, such a large fleet is needed because any progressive company, regardless of the nature of its business, must have modern tools to compete successfully for customers' business.

Northern Illinois Gas Company is selling service, which is as important as selling natural gas. Good service requires modern tools, and a good transportation fleet certainly is a "tool" of good service.

Tractors, trenchers and air compressors are "musts" in our business. Trucks and trailers are needed to haul the heavy tools needed. These items are the backbone of the equipment needed to install mains and services for new construction and for maintenance work. More vehicles of these types than any other types have been added during recent years.

This isn't meant to understate the importance of passenger cars. They, too, are transportation "tools," permitting employes to respond to customers' needs more readily and conduct other company business efficiently. The distance these passenger cars traveled last year—about 11,127,000 miles—represents about 64% of the total recorded mileage traveled by the entire fleet.

When customers see those gray cars, trucks, tractors and trenchers on the road in northern Illinois, they know that Northern Illinois Gas Company, as always, is on the job. * * *



**Explosion-proof automatic butane-air diluters** in two-compartment weatherproof, insulated housing. At left is the 2000 cfh diluter with a capacity of 1,050,000 Btu of 525 Btu mixture. At right is the 1000 cfh diluter with a capacity of 1,400,000 Btu of 1400 Btu mixture. Each system is independent and feeds controlled-ratio mixture of butane-air or propane-air, having 525 to 1400 Btu equivalent, to appliance testing area.

# Automatic Butane Diluters Aid Appliance Testing

***Roger Thompson,*** *Plant Engineer, A.G.A. Laboratories, Cleveland, Ohio.*

Gas-fired ranges, water heaters, air conditioners, dryers and the multiplicity of other gas appliances gaining broad acceptance over the entire continent of North America must be able to operate safely and efficiently on gas fuels having a wide range of Btu content.

The American Gas Association Laboratory tests many of these appliances to determine their ability to function safely and satisfactorily on the many types of gas available from fuel suppliers in the areas wherein the equipment will be used.

Installed outdoors in a two-compartment weatherproof metal cabinet, two Selas butane-air mixers — one 1000 cfh and one 2000 cfh—complete with explosion-proof electrical controls and safety auxiliaries, are simplifying this testing. The laboratory utilizes preselected fuel mixtures ranging in value from 525 to 1400 Btu per cu ft, delivered at constant pressure, to the appliance testing area.

**Operation of the unit is automatic after initial start-up is completed.** The safety system — a complete, independent complex for each of the two compartments in the unit—instantaneously and automatically shuts down the entire unit in the event of power failure, low gas pressure, or over-pressure. Once a fault occurs, electrical interlocks prevent functioning of any of the gas inlet valves as long as the malfunction or fault is indicated by any of the detecting safety components. Restarting must be done manually.

Numerous daily requirements for small quantities of gas at specified Btu content for short tests would ordinarily result in frequent on-off cycling of a diluter's motor and mixing valve, possibly resulting in an off-ratio mixture. To assure against this condition and to prolong the life of the mixing equipment, a supply tank on each system stores a relatively long-period supply of mixture, having the desired Btu content, at 1 to 3 psig, thus eliminating the otherwise frequent on-off cycling of the diluter.

Once in operation, either diluter takes air from the surrounding atmosphere, through a filter and solenoid valve, and propane or butane from an external source. It delivers the two in a controlled-ratio mixture to the supply tank until the tank high-pressure cut-off switch opens at 3 psi, stopping the diluter motor. Mixture from the tank bleeds continuously through a regulator into the laboratory inlet pipeline at a constant pressure.

When the pressure in the tank has dropped to 1 psi, the diluter motor is

# MAYCO

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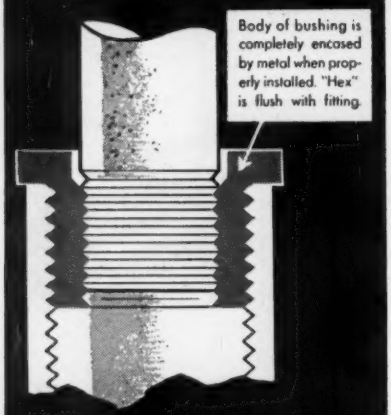


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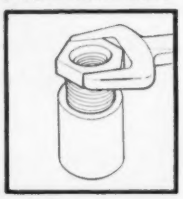

Most sizes also available with extra-heavy "Hex" to facilitate use of ordinary wrench.

Couplings and unions also available factory equipped with Mayco bushings.

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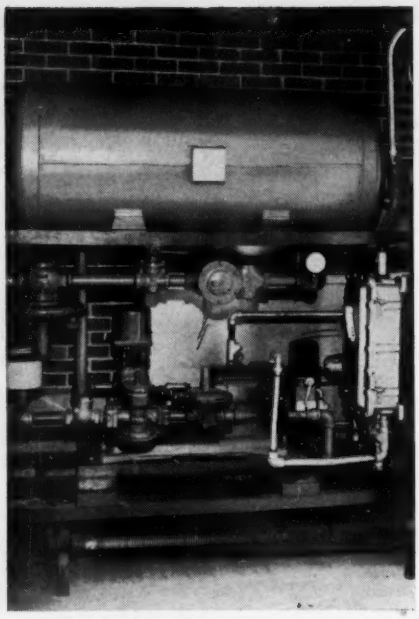
*Manufacturers of: MAYCO dielectric fittings and MAYCO water softeners and filters*

**Butane diluter system** close-up shows the Selas diluter with air intake filter, mixing valve, zero governor, mixture positive shut-off solenoid and manual reset high and low gas pressure shut-off valves in piping to supply tank. Selas automatic "Firecheck" protects tank mixture outlet.

again energized by the pressure control switch in the mixture tank. Positive shut-off explosion-proof solenoid valves, closing instantaneously upon interruption of power in the electrical control-safety circuit, shut off incoming gas and prevent back-flow of gas-air mixture into the air inlet line.

**Visual alarms and recording manometers** have been installed in the system. An audible alarm, common for both sides of the system is connected to a "sniffer" located near the bottom center of the cabinet. Its circuit is actuated by any concentration of combustible gas exceeding ½% by volume of the immediately surrounding air.

Diluter motors operate on 220-v., 3-phase a-c power with overload protection. Control and safety circuits are 220-v., a-c, taken from one phase of the incoming main power supply. All wiring is in conduit, and auxiliaries and enclosures meet Class 1, Group D., Div. 2 requirements.

Steam heater strips with a capacity of 26,000 Btu per hr keep the temperature of the butane well above its condensing point (32 F). They keep the temperature in the weather-proof housing above 65F during outdoor temperatures as low as minus 10F.

Similar mixing units are in operation at other testing locations and on applications as gas utility company stand-by units. Any capacity and pressure requirement can be satisfied, and motive power for the mixers can be gas, electric, diesel, gasoline, or other, in accordance with available power supply or fuel. * * *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# Why Corrosion Mitigation For Gas Distribution Systems Is *Different*

*John Emery, General Superintendent, Rio Grande Valley Gas Company, Brownsville, Texas*

**Corrosion mitigation in gas distribution systems** is a specialized segment of corrosion control work encompassing several factors not generally found in similar work for long-line gas transmission lines.

Generally speaking, gas lines in distribution systems are smaller, are laid as a network of lines in other metallic networks, are more exposed to physical damage to coating, are made up of more than one kind of metal, are more exposed to accidental contacts, are protected by smaller amounts of d-c current at any given location, are more susceptible to insulation failures, and generally are changed or expanded more often.

Most gas distribution systems over the country were not laid down as a unit at a given time; rather, the systems were laid a section at a time, at different periods of time. In other words, these gas systems are made up of more than one metal, varying sizes of pipe, varying coating specifications, and are laid as a network of metal rather than as a single linear pipeline.

Add to this network system of gas piping, the many metal water lines, underground telephone cables, underground street lighting systems, railroads, and other metallic systems—also laid as networks, all interwoven—and the picture begins to become confused.

**Isolating the gas system**—or insulating if you prefer—becomes a major problem. Chance of accidental contacts is considerably increased in distribution systems as compared to transmission long lines. Construction of water lines, underground cables, metal fences, metal buildings, and the like is concentrated in a small congested area. Also, more of this construction takes place in such areas, as compared to rural areas. All this leads to greatly increased possibilities of accidental contacts—all of which drain or waste current intended to protect gas distribution systems.

Fig. 1 shows a system of gas mains, superimposed on a system of water mains, as often occurs in a distribution system. The possibility of contacts, or the possible contact points in a small area is shown to be much greater than on a transmission line as shown in Fig. 2.

The fact that average size of gas distribution piping is much smaller than sizes used in transmission lines is a contributing factor toward the use of smaller amounts of d-c current used for cathodic protection, at closer intervals of impression. A pipe-to-soil of 2.0 to 2.5-v, negative, with reference to a copper-copper sulfate half-cell is rather common on long line rural transmission lines protected by impressed rectifier current. Protection of gas distribution lines is more likely to be accomplished at values of 0.85 to 1.25-v. And, while 50 amp or more may be impressed at one location or ground bed on large transmission line; 2 or 3 amp is a large amount of current to impress at some points on distribution systems. In fact, it is rather common to install single anodes at given locations with outputs of less than one ampere on some distribution systems.

The smaller voltage levels normally seen in distribution systems, as opposed to transmission work, is shown graphically in Fig. 3. Probability of interference dictates lower currents and voltages in distribution systems.

**Isolating gas lines from foreign structures** is of primary importance in applying cathodic protection on either

Fig. 1

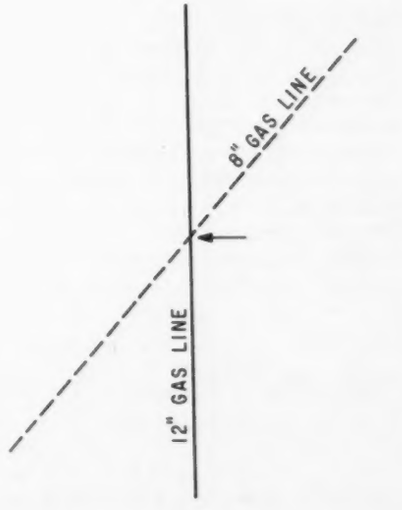


Fig. 2

transmission or distribution lines, but the magnitude of the job of doing so is much greater in distribution work. Normally, transmission lines have few laterals or taps, while distribution lines have many. The likelihood of missing insulation of these taps and laterals is greatly increased in distribution work, as is the probability of insulation failures. These many points to be insulated, however, provide one definite advantage. Each of these points can be used as a test point to check cathodic protection levels.

Current source for large transmission lines usually is a-c power, rectified and transformed to a usable d-c voltage, and impressed on the pipeline through a "ground bed" of carbon rods. Space required to do this, can run as high as several hundred linear feet at right angles to the pipeline. Even if currents of the magnitude used on transmission lines could be tolerated in distribution systems, space to do the job would be a real problem. "Deep ground beds" can overcome this space problem, but they are expensive.

Generally, in distribution systems, magnesium or zinc is buried within a few feet of the main or service to be protected, and the points of current impression are many times that of transmission systems.

**Many existing gas distribution systems** 30 years old or older have areas of old bare pipe in service. Often this bare pipe has sections of coated pipe spliced in at various places, making protection difficult. If mechanical couplers were used, these must be checked to see that new coated pipe is not flowing current to a section of old pipe and being returned through an "iron-bound" coupler. Flanges or insulating couplers sometimes have to be installed to break-up this current path.

When such couplers are used to tie together sections of coated pipe; if it is desirable to protect these sections as a unit, then a path for current flow through these couplers must be provided. This is often done by brazing a copper bond externally. Often, in cathodically protecting a distribution system, no such bond is installed on these couplers because they were "iron-bound" and passed current at that time. Loss of protection on sections of pipe is often traced to these couplers which have come "un-iron-bound."

**Paralleling of numerous metal lines in a gas distribution system** leads directly to another serious problem, that of contacts with abandoned steel lines. Often old bare gas and water mains and services were abandoned in place where replacement lines were laid; and sometimes these sections are several hundred feet in length. Although this condition can exist on transmission systems, and does exist, chances for accidental contacts of this nature are considerably more numerous on gas distribution systems.

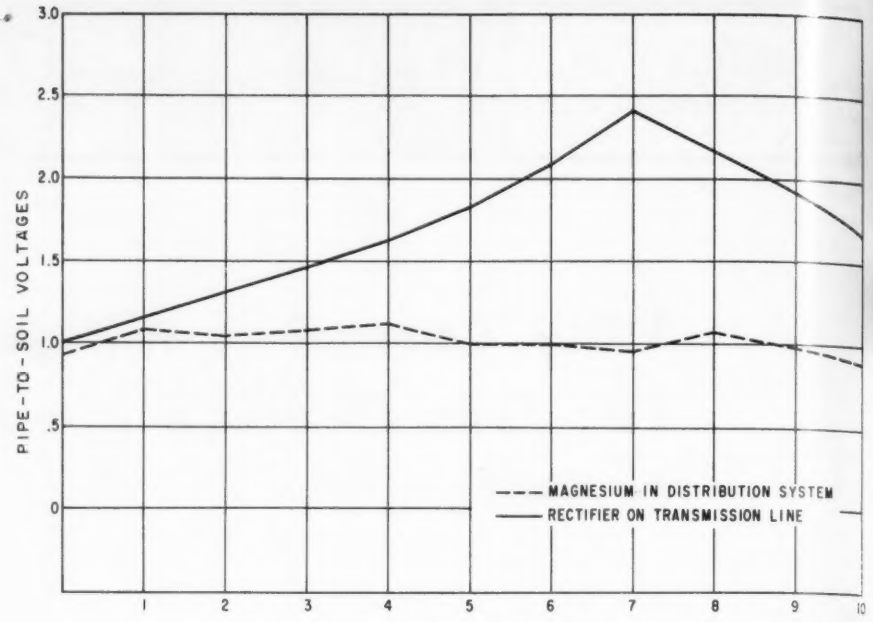


Fig. 3

Generally, it is much easier to spot such contacts and eliminate them on a straight, long-line transmission system. Pipe-to-soil readings often point directly to such contacts, and current direction tests and pipe-locations may be used to pin-point the point of contact. Fig. 4 illustrates graphically a typical area of bare metal, either as a contact or as bare pipe in service. Large areas of bare metal show as lowered pipe-to-soil potentials. In a gas distribution system of criss-crossed lines, an area of several blocks may be a contact area, and finding the contact or contacts is a more complicated task.

Old, bare, gas lines in distribution lines, upon being abandoned in place, should at least be cut into sections of possibly one block maximum length. Thus, any contact would be limited to a one-block area and would immediately narrow the search to this length. Of course, when old, bare, abandoned water lines are found to be in contact with gas lines in service; it is sometimes

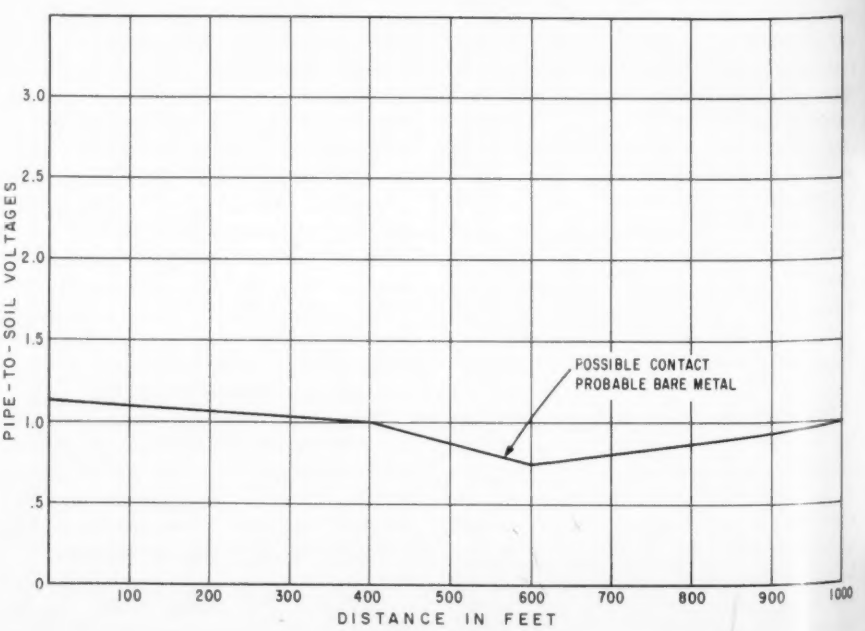


Fig. 4

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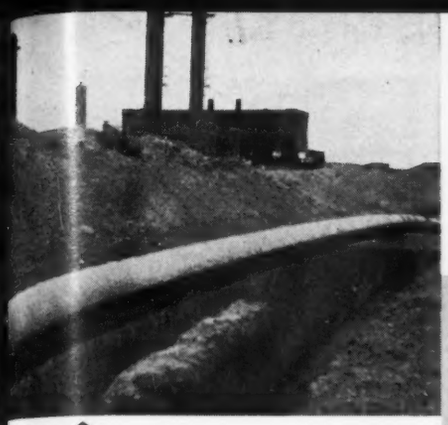

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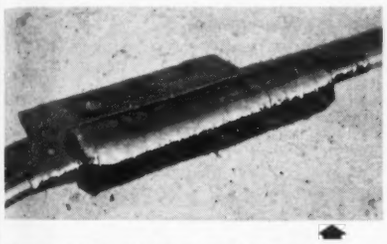
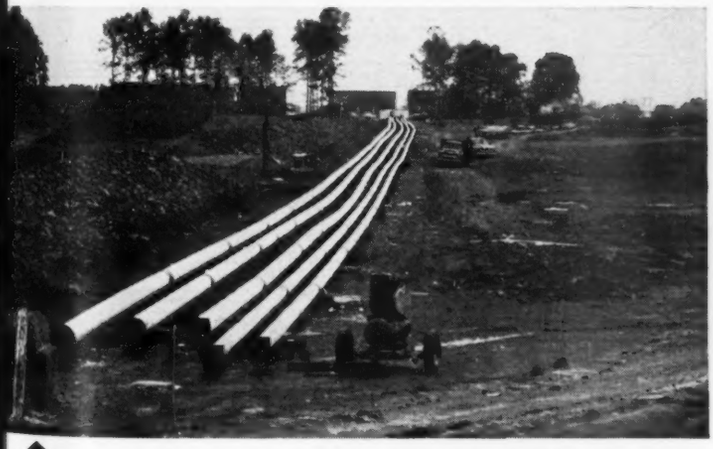


**CABLE AND CABLE SPLICES** in communications service are effectively and economically protected by TAPECOAT.

Lines in **OFF-SHORE DRILLING** operations need joint protection equivalent to the mill-wrapping on the pipe. TAPECOAT is most economical because it gives lasting protection in underwater service.



**AIRPORT FUEL LINES** need the quality joint protection assured by TAPECOAT. It is easy to apply by spiral or "cigarette" wrapping depending on the size of the pipe. No training needed.

**STEEL MILL** water lines in this new plant are joint-protected with TAPECOAT. TAPECOAT can be used to advantage to protect any steel surface in underground service, as proved since 1941.

**UNDERGROUND GAS STORAGE** facilities can be "buried and forgotten" when protected by TAPECOAT. Note protection of tanks, pipe and pipe joints.

Lines buried in cinders in **RAILROAD YARDS** need the sure protection provided by TAPECOAT. There's a size for every purpose from 2" to 24" in width.

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expedient as a practical matter to cut the old line into sections when found, to narrow the search for a contact. Pipe-to-soil readings will indicate which section is grounded to gas line in service and under cathodic protection.

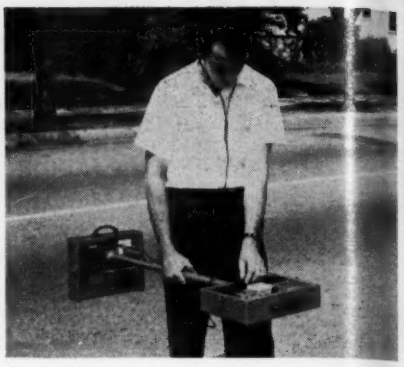
**One mistake easily made in applying cathodic protection to a gas distribution system is that of trying to cathodically protect large segments of pipe as units.** DISTRIBUTION systems should be divided into reasonably small segments by insulating. Not to do so is an invitation to trouble locating accidental contacts. Also any loss of protection can thus be confined to a small area.

As a practical matter, in protecting distribution systems with magnesium or zinc anodes, it is desirable to determine what size anodes are to be used to obtain the desired anode life. Often in a given locale, for example, a 32-lb magnesium anode may give a 12-year life under average soil and pipe conditions, whereas a 17-lb anode would give less than a desired 10-year life. While the life of anodes might vary from 7 to 15 years under these conditions, it is expedient to design on averages.

A considerable amount of correlation is necessary between the cathodic protection and operating departments of gas distribution systems. For example, it is desirable to apply cathodic protection to all new and replacement pipe in a system and insulation is logically applied at the time of initial construction. It is also desirable to break a distribution system into insulated sections at the time of initial construction, or during replacement work. Often cathodic protection work progress on old gas distribution systems is dependent largely upon the replacement of old, bare pipe with coated and wrapped pipe.

**Pipe-to-soil readings on outlying areas of gas distribution system** are not at all static due to the fact that extensions of existing mains are constantly being made. On coated pipe, small extensions will not appreciably change these readings, but large extensions or replacements can appreciably change these readings, and provision must be made to protect this additional steel.

**The one thing that will do most toward making a success of cathodic protection on DISTRIBUTION systems is the education of operating personnel.** Once these people understand the basic principals of corrosion and corrosion control, and become conscious of their role in proper day-to-day construction practices, a number of the headaches mentioned previously can be avoided and the work of a corrosion department simplified. * * *

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This portable precision instrument makes short work of determining exact location and depth of buried pipes, cables, manhole covers. Not a radical experimental design, but proven by years of use in municipalities and industry. Full effectiveness in **all** temperature ranges.

Housed in rugged aluminum case, Detectron "505" features shielded loops and locked-in tuning for pinpoint accuracy; unit construction for simple maintenance. **WRITE TODAY FOR DATA AND LOW PRICES.**

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DIVISION OF TINKER AND RASOR

P. O. Box 243 • Dept. E-10 • San Gabriel, Calif.

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**MIDWESTERN* — Symbol of protection against corrosion**

**Forces are changed but need for protection is the same**

Midwestern's line of corrosion-resistant products offers you the most completely engineered protection in the pipe line industry. Successful performance under exacting field conditions has proven each product in the line.

Anticipating every need to protect your pipe . . . Midwestern's line includes: . . . KERMAC outerwrap . . . KEYSTONE asbestos felt . . . KAPCO rock shield . . . COROMAT underground wrap . . . GLASFAB brand handwrap . . . GLASKOTE torch-applied joint wrap . . . POLYKEN tape coatings.

**A Midwestern Man from one of our nine branch offices, located throughout the United States and Venezuela, is anxious to tell you about these protective products and to serve your corrosion needs quickly and efficiently.**

*MIDWESTERN PIPE LINE PRODUCTS CO.

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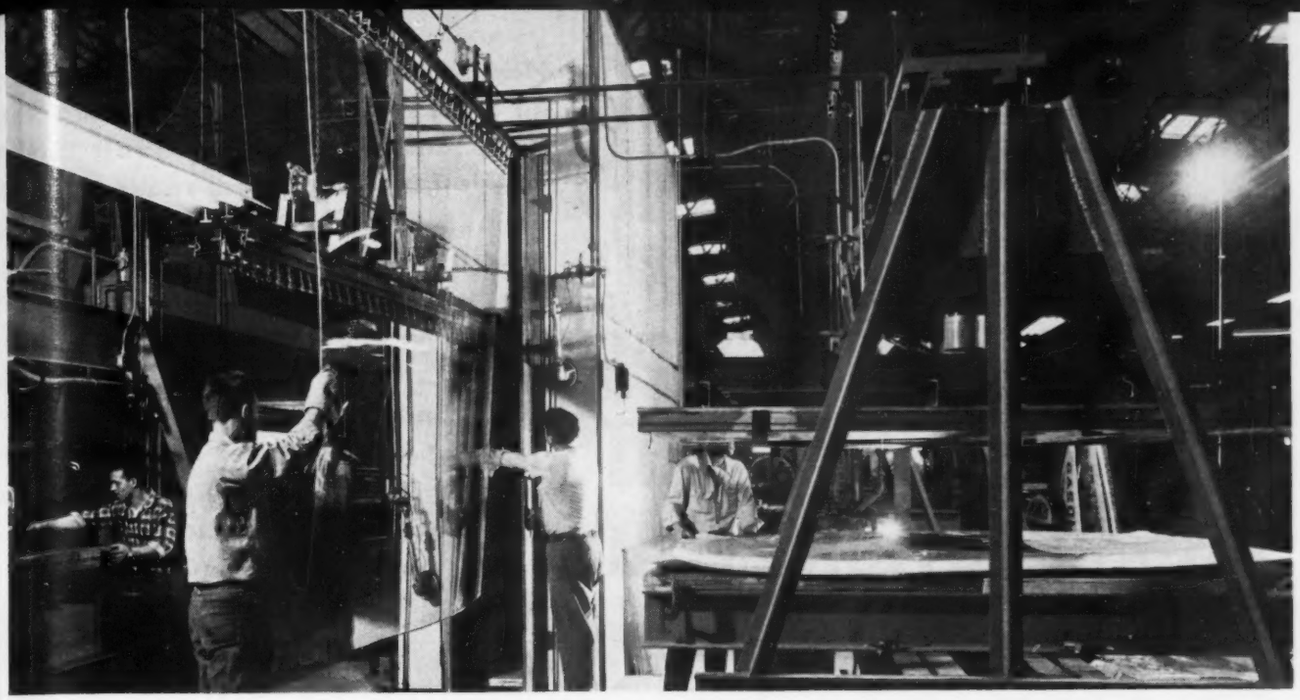

**A large sheet of plastic** is moved into a gas-fired oven to be made pliable for forming by presses at the NPI plant.

# Gas Ovens Make Plastic Signs Practical

***Howell G. Kanode,*** *Business Promotion Department*
*West Ohio Gas Company, Lima, Ohio*

Workm[an] lower sign into place at Peoples Natural Gas Co. northern division headquarters in Armstro[ng] County. Signs were put up throughout Western Pennsylvania.

**Simplicity of use** is the reason given by the world's largest manufacturer of plastic illuminated signs as to why natural gas is used in the production of signs and displays.

Thirty-year-old Neon Products Incorporated of Lima, Ohio, pioneered in the design and development of colorful outdoor and indoor lighted plastic signs. For its growth to leadership in the industry, credit belongs to co-founders Sam Kamin and James Howenstine.

During the early days, the imagination and talent of the two were taxed to the limit. Kamin made layouts for the first general item — a framed neon sign with changeable letters or cards. Howenstine took over production, often bending tubes himself. Kamin assumed sales responsibilities from the start, loading finished signs in his car and selling them throughout the midwest.

From these two men, NPI has grown to a work force of more than 400 with an annual payroll of more than $1,000,000. Instead of one downtown storeroom, the plant is located on eight acres of land and includes more than 300,000 sq ft of floor space.

Most noticeable progress was made after World War II. After months of

# COUPLING SPEED CHAMP —DRESSER® "STAB-38" T.M. FROM BOX...TO PIPE ...TO GAS-TIGHT JOINT IN NOTHING FLAT

**Here's the DRESSER "Stab-38" coupling all dressed up in a one-piece suit. Thanks to its gasket design, DRESSER "Stab-38" comes fully assembled, ready to install almost nothing flat! No piece-by-piece assembly. With DRESSER "Stab-38", just slip the coupling over one pipe end...slide the other pipe end into the coupling...tighten the bolts. ■ It's fast: "Stab-38" takes just 60-seconds per bolt! ■ Easy: It's a DRESSER Coupling—so all it takes is a wrench! ■ Permanent: DRESSER "Stab-38" is the same dependable 70-year time-proved coupling as the famous Style 38. Only the design**

**e gasket has been changed, so you can ip the coupling on the pipe without taking apart. The DRESSER "Stab-38" is shop- ated with special "Red-D" thermosetting henolic resin, compatible with all field atings. For details, see your Dresser Field epresentative.**

dmd
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MANUFACTURING DIVISION
BRADFORD, PENNSYLVANIA

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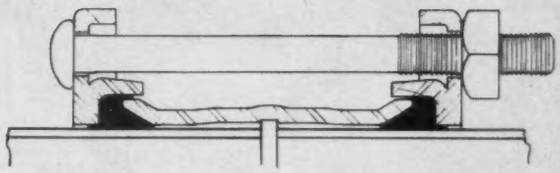
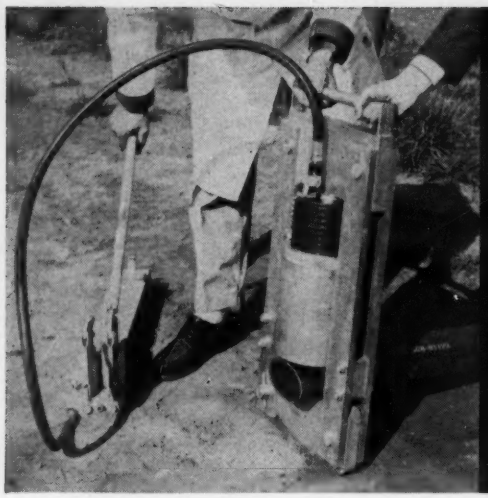


*Special gasket* stays in place, permits "Stab 38" to be installed in one piece. Armored gaskets maintain electrical continuity.

*Also available:*
DRESSER "Stab-39" insulating coupling – otherwise identical to "Stab-38".

**3** slide other pipe end into coupling . . .

**4** tighten bolts to 80-lb. torque. This 8" DRESSER "Stab-38" took just 8 minutes to install!



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75-TON
FLOW-STOP
REGENT
HYDRAULIC
PIPE SQUEEZERS
FOR FAST GAS LINE
REPAIR & MAINTENANCE

COMBINES HIGH EFFICIENCY WITH MINIMUM WEIGHT

This latest addition to the Regent line incorporates advanced design features to provide unsurpassed efficiency. Now available, the Model 5230, completely closes up to 4" I.D. steel pipe in 125 seconds against 100 psi line pressure. Regent Flow-Stop Pipe Squeezers, 15-ton, 40-ton and 75-ton, enable you to close all sizes of cold-steel and copper pipe from ½" to 4" I.D.

SAVES TIME AND MONEY ON:

- Emergency shut-offs
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The most effective PIPE LOCATOR in the world

FIELD PROVED
the award winning
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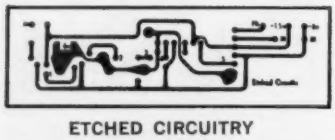
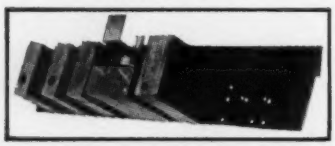
TRANSISTORIZED
PIPE LOCATOR
MODEL TR-1A

Utility and Construction Companies, Municipalities are unanimous in agreeing that MODEL TR-1A has proved most effective for locating mains, services, valves, conduit, high voltage lines, telephone cables. Easily separates parallel lines and can be used to trace non-metallic pipe lines. Complete piping systems traced out.

SPECIFICATIONS: Size of cases when clamped together: 9½" x 12½" x 5½" • Size of transmitter and receiver boxes, each: 9½" x 12½" x 2¾" • Operating weight, transmitter: 4½ lbs. • Operating weight, receiver: 4¾ lbs. • Circuit: Transmitter—one transistor, Receiver—six transistors • Batteries: Transmitter—4 size C flashlight cells, Receiver—4 size C flashlight cells • Switching: a. Automatic power switching for all "on-handle" operations. b. Automatic "turn-off" when set is not being used.



ETCHED CIRCUITRY



ENCAPSULATED PARTS

SEVEN TRANSISTORS

The GOLDAK Company, Inc.
Leading Electronic Manufacturers
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intensive experimentation, NPI finally perfected *Plastilux 500*. Made of formed plexiglas faces, enclosed in rust-proof metal and lighted by slimline fluorescent lamps, this has proved to be the answer to dealer-display problems, inside and out.

**Development of processing with natural gas** played an important role in progress from 1950 on. Before the 1950's were many months old, 90% of NPI's production was converted to the manufacture of plastic, as against neon, signs. New production techniques had to be developed. NPI engineers had to design and build most of their production equipment.

A case in point is the four gas-fired ovens used in the preparation of wide plastic sheets for the multi-shaped-and-sized molds used to produce dealer identifications for some of the nation's leading brand names.

Under Howenstine's keen manufacturing savvy, ovens were built to handle the largest 100-in. by 120-in. sheet of clear plastic. "The only natural way to make the plastic pliable enough for molding is to insert it in ovens and circulate air around it at high velocity," Howenstine said.

The sheets are "soaked" in 350 to 400 F circulated air for three to four minutes. Six blowers circulate the air from the bottom over 5-in. wide pipes that wind through the outer sides of the narrow, but roof-high ovens.

Natural gas is employed in various sizes of custom built ovens to heat sheets of plastic to a pliable state so they may be pressed or vacuum formed to various designs.

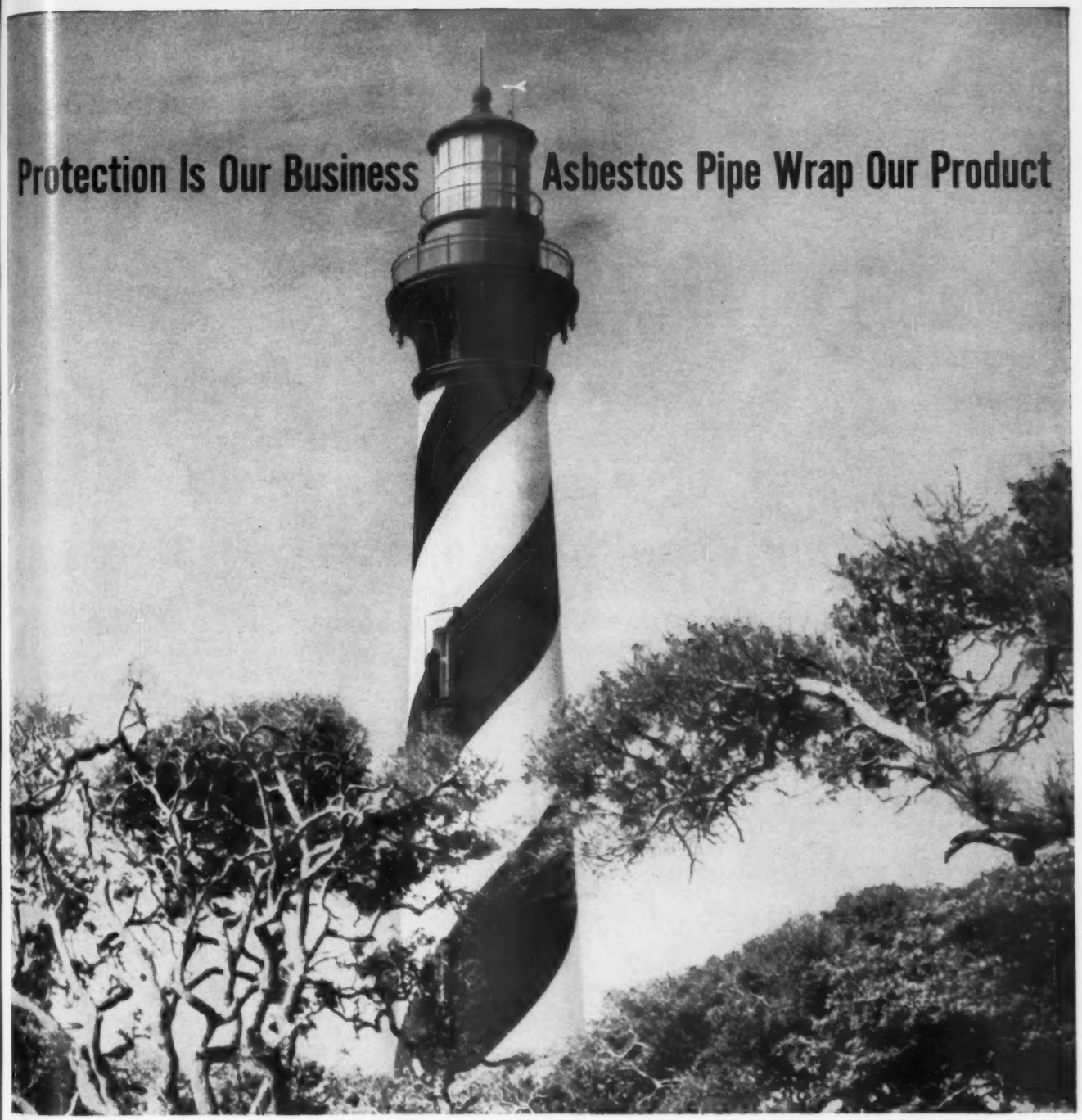
The ovens vary in sizes from 4 ft by 4 ft by 8 ft to 4 ft by 12 ft by 16 ft and are equipped with surface combustion burners capable of passing 103-cu ft per hr.

The number of burners used per oven depends on the size of the oven and internal temperature is maintained (thermostatically) at approximately 350 F.

Each oven can form a sheet every six minutes. A sheet is either ⅛-in. $\frac{3}{16}$-in. or ¼-in. thick and can be taken from the oven and molded on one of four presses available near each oven.

NPI created the ovens and built them of structural steel frames with a good grade of Marinite insulation to keep the heat constant. Special clamps had to be designed for the all-important overhead conveyors that carry the plastic sheets into and out of the high capacity gas-fired ovens.

Besides "soaking" the plastic sheets to make them pliable, gas is used in a small single pass paint drying oven of the same type and design. ★ ★ ★




**Through complete Quality Control—Nicolet Asbestos Pipe Line Felts have received universal acceptance for their uniformity and absolute dependability.** ■ Whether your pipe line requirements demand Nicolet Asbestos #15 "Standard", #8 "Tufbestos" or #10 "Reflecto" (the new, improved, white Asbestos Felt) you are assured of getting the best protection obtainable. ■ And now—the addition of "Old Nic" Glass Wrap to this family of Pipe Wrap products makes Nicolet your best source for complete pipe line protection. ■ "Old Nic" Glass Wrap has uniform porosity which allows hot tar or asphalt enamel to bleed through, while letting hot gas escape, minimizing "holidays". "Old Nic" Glass Wrap will most effectively protect yard wrapped pipe against impact damage. It is equally effective in over-the-ditch operations. ■ **Write today for full specifications and samples of Nicolet pipe protection products.**

**Distributed throughout the United States**

**NICOLET** INDUSTRIES, INC.

FLORHAM PARK, NEW JERSEY

Backhoe operator Donald Krug of Iowa-Illinois Gas and Electric Company makes initial cuts for new service connection in Fort Dodge, Iowa.

New mill-wrapped pipe for gas main extensions to serve community of Coalville, Iowa, is loaded at Fort Dodge, Iowa operating center by I-IG&E personnel.

# Distribution Developments

NEWS ABOUT CURRENT AND PLANNED CONSTRUCTION

**Peoples Gas Light and Coke Company,** Chicago, has completed work on the southern section of its new $20,000,000 interstation gas main. A total of 4300 tons of 36-in. steel pipe was used for the 11-mile, $9,000,000 segment that extends from the company's Calumet Station, 3200 E. 98th Street, to 58th Street and Damen Ave. The completed work is the second phase of a three-year project. The first 8-mile segment was constructed last year on the north side. The third, or central, section connecting the other two will be installed in 1963. When finished, the new line will intersect other gas mains and will interconnect with pumping stations of the distribution system of Peoples Gas. It will increase the distribution system's capacity and permit greater flexibility in meeting peak heating demands.

**Southern Counties Gas Company,** Los Angeles, has completed a $460,000 construction project designed to expand service to the company's customers in Ventura County. The project in the Simi Valley and the Santa Susana Mountains provides new distribution gas lines to the communities of the valley and new service lines to the field facilities of Rocketdyne and Atomics International, divisions of North American Aviation, Inc. Nearly 58,000 ft of supply lines, including 39,000 ft of 12-in. main, have been installed in the area running north from existing lines near the Ventura Freeway, along the western edge of the Burro Flats area of the Santa Susana Mountains, down into Simi Valley where it connects with existing distribution facilities at Los Angeles and Church Streets in Simi. Hood Construction Company was the contractor for the project. E. R. Brooks, distribution supervisor for the gas company's Ventura County division, was the company's liaison on the project. Tom L. Vennett, construction coordinator, was Southern Counties' representative on the actual job site. More than 17,000 ft of 6-in. main will serve the facilities of North American's divisions in the Santa Susana Mountains. Prime user of the gas supply will be the Atomics International division for use in its sodium component testing programs.

In another recent project, contractor crews of Ventura Pipeline Co. relocated about 3000 ft of 16-in. line as the result of proposed future extension of the Ventura Freeway. Two different sites were involved in the project. About 2 miles north of Ventura on the Rincon stretch of the freeway, a section of the line had to be moved out of the direct path of the freeway. A mile farther north, another portion of the line was lowered and relocated to cross under the path of the freeway at a right angle.

Hydraulically controlled side boom on a tractor-shovel makes quick work of pipe laying for new distribution system near Middletown, Ohio. Distribution contractor Bond and Sheehand laid some 4500 ft of 4 and 6-in. mains on the project for the Northern Division, Cincinnati Gas and Electric Company.

**Ohio Valley Gas Company,** Columbus, Ohio, recently completed a $45,800 relocation project in conjunction with the widening of Sunset Boulevard (Route 22) in Steubenville. More than 1½ mile of new line—4 and 6-in.—was laid along Sunset Boulevard between Brady Avenue and the corporation line to replace 8 sections of an existing line. Ohio Pipeline Construction Co. was the contractor.

# How you can get the *MOST DIGGER* for your equipment dollars

DIGGING • LIFTING
**HANDLE WITH CASE** *Utility*
LOADING • CARRYING

When you're shopping for a backhoe rig, you naturally weigh the work capacity of each machine in terms of the dollar-outlay involved and possible lowered costs for operation and maintenance. Here are some facts that will help you get the most for your company's equipment dollars in 3 typical situations:

I. If you are in the market for a high-speed rubber-tired hoe, you can get a *14′ digger at a 12′ price* by investing in a Case 530 *Utility* Backhoe-Loader. Powerful backhoe gives you 13,000-lb breakaway at full reach from pivot. It reduces dig-dump cycle-time with *exclusive* foot-controlled hydraulic swing. Model 530 is built for heavy day-in and day-out digging with alloy-steel boom, dipper stick and buckets; powerful hydraulics . . . plus equally rugged 2000-lb front loader.

II. If you need a mobile digger for trenching to *only 10′ deep,* you'll get a *heavy-duty machine at economy-rig cost,* in a Case 430 *Utility* Backhoe-Loader. This 10′ machine gives you 10,000-lb breakaway at full extension of boom . . . rugged tractor and 1200-lb loader, all similar in design to the big Case 530 rig.

III. If you're looking for a low-cost *crawler* hoe for work in mud, snow or rough going, you'll *save $1000's on the purchase of such a rig,* with a Case 310 *Utility* Crawler Backhoe-Loader. This unit incorporates the same rugged, fast-digging 14′ hoe as Model 530 (above), but on a powerful compact Model 310 crawler tractor with husky ¾-yd front loader. You don't have to buy a big tractor or shovel-type hoe for 14′ deep trenching.

See Case *Utility* FIRST . . . for the biggest dollar-value in backhoe-loader units. Call your Case Dealer for free demonstration of any or all 3 models. Or for free descriptive literature, write J. I. Case Co., Racine, Wis., Dept K1731.

CU-BL-300

Model 530. This rig is equipped with power-steer, shuttle transmission and special tires for extra dig-power and speed with 2000-lb loader.

Model 310. Here is the easiest-operating crawler tractor on the market. You can hop right in from a rubber-mounted rig and feel "at home".

**CASE**®

J. I. CASE CO., RACINE, WIS.

## *Distribution Developments*

Street scenes in the Elmira-Elora-Fergus area of Ontario this summer found side-boom tractors lowering-in new gas mains for Union Gas Company of Canada (left) while trenches were being backfilled mechanically (above). Service to the three communities, and to new systems in St. Jacobs and Salem has begun; work included five city gate stations. Overall project is part of a long range program to make gas available to many new Ontario communities.

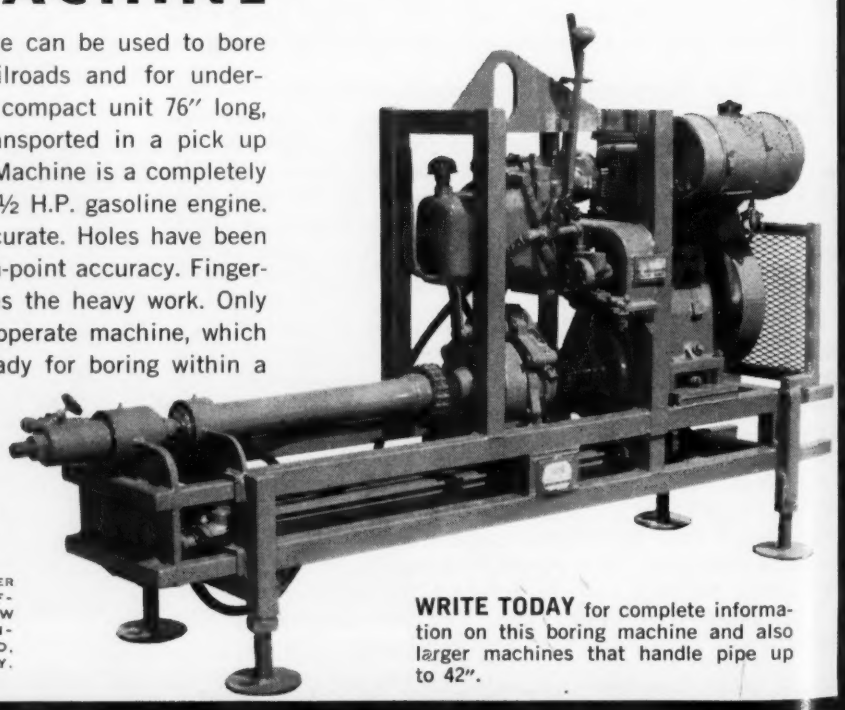
**Pioneer Natural Gas Company,** Amarillo, Texas, has budget of $1,041,400 for new construction in 1961. Mains to serve new customers will account for $697,000; mains to increase capacity, another $121,600. In Lubbock, projects totalling $28,500 have been budgeted; included are $12,700 for 1400 ft of 16-in. for high and intermediate pressure system; $7600 for 4600 ft of 4-in. intermediate pressure line; and $8200 for 3000 ft of 6-in. intermediate pressure line. In Midland, approximately $35,000 will be spent to install 6100 ft of 8-in. IP line. In Odessa, two projects totalling $90,000 are scheduled this year; 11,160 ft of 12-in. high and intermediate pressure line at a cost of $66,200; and 3800 ft of 10-in. IP line at a cost of $23,800. In Takoka, 5450 ft of 6-in. IP line will be installed at an estimated cost of $16,200. In Big Spring, two projects totalling $53,100 are budgeted—11,850 ft of 6-in. IP at a cost of $32,400; and 3600 ft of 8-in. high and intermediate pressure line at a cost of $20,700.


*For small diameter road boring jobs*

• A NEW SELF-POWERED • ACCURATE **CROSE-PERRAULT**

**BORING MACHINE**

The Crose portable boring machine can be used to bore holes under streets, highways, railroads and for underground service. The machine is a compact unit 76″ long, 39″ high and 20″ wide. Easily transported in a pick up truck since it weighs only 595 lbs. Machine is a completely self-contained unit powered by a 7½ H.P. gasoline engine. Outside power is not required. Accurate. Holes have been bored up to 75 feet with almost pin-point accuracy. Fingertip controlled hydraulic power does the heavy work. Only 12 feet of open ditch required to operate machine, which can be positioned in bell hole ready for boring within a few minutes.



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2765 DAWSON ROAD • PHONE WEBSTER 6-2171 • TULSA, OKLAHOMA • BRANCH OFFICES: HOUSTON, TEXAS • ELIZABETH, NEW JERSEY • IN CANADA: CROSE-PERRAULT CANADA, LTD., EDMONTON, ALBERTA • TORONTO, ONTARIO • EXPORT OFFICE: NEW YORK, N. Y. • CABLE ADDRESS: CROSE

**WRITE TODAY** for complete information on this boring machine and also larger machines that handle pipe up to 42″.

# Eclipse *Wedgeseal*® Union-End Gas Cocks combine shutoff with insulation... *and reduce installation costs*

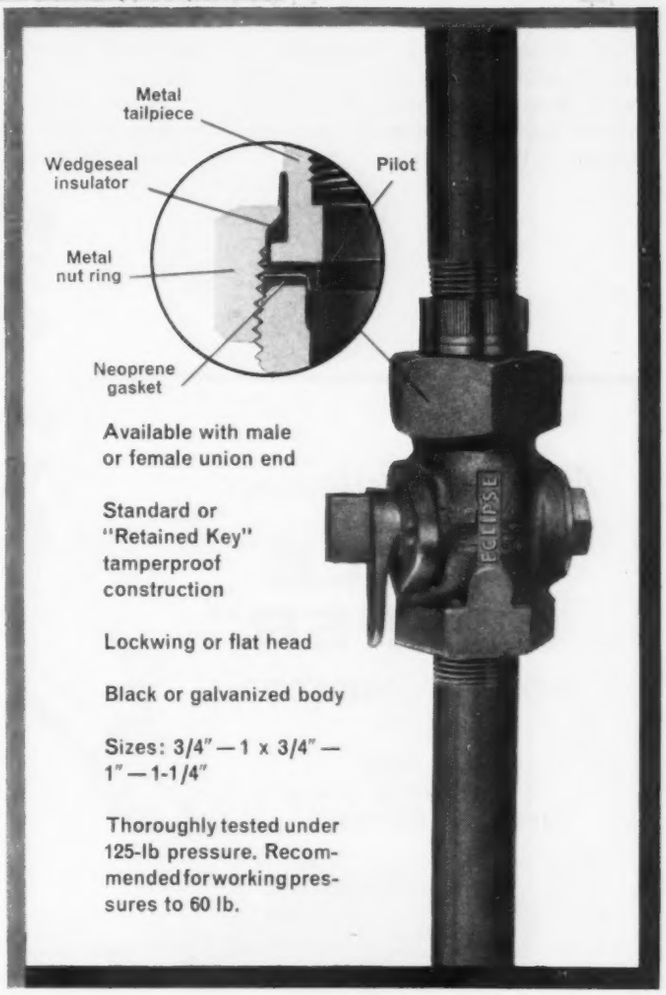
## The *Wedgeseal*® insulator is integral *can't be lost or left out*

With Eclipse Wedgeseal-insulated gas cocks, you combine shutoff with insulation of mains and services against induced or stray house currents — and reduce installation costs.

The initial cost is lower than a separate gas cock plus insulating union. The number of threaded connections is reduced. Expensive on-the-job make-up time is eliminated. The pilot on the tailpiece holds gasket during assembly and retains it in use. High-compression sealing remains tight under piping strains.

The Wedgeseal insulator is integral with the tailpiece of the gas cock. It will not shear off, pull out, or crack in service — withstands over 350 ft-lb torque. The material is suitable for continuous use at 275° F and is form stable at 400° F. It is weatherproof and unaffected by natural, manufactured, or LP gas.

Performance has been thoroughly proved in thousands of installations since 1957. For complete data, write for new Bulletin 600.




Available with male or female union end

Standard or "Retained Key" tamperproof construction

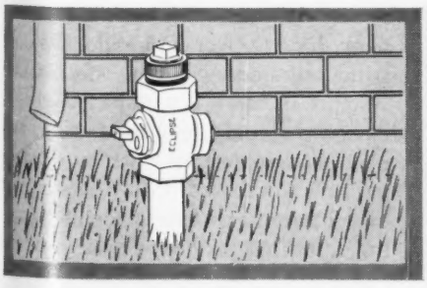
Lockwing or flat head

Black or galvanized body

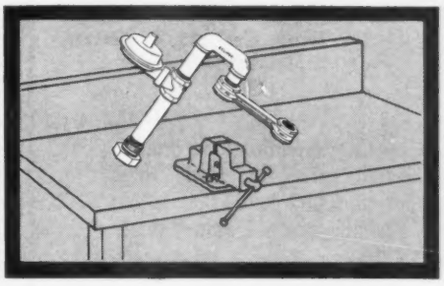
Sizes: 3/4" — 1 x 3/4" — 1" — 1-1/4"

Thoroughly tested under 125-lb pressure. Recommended for working pressures to 60 lb.

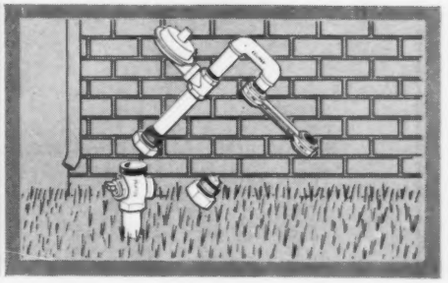
**Standardized shop-controlled installations for outdoor meter sets**



Install an Eclipse Wedgeseal-insulated gas cock on end of riser. Screw pipe plug into tailpiece to keep out dirt until the meter loop is attached.



Now you can conveniently preassemble and test the meter loop in your shop. Permanently install a two-thirds Wedgeseal union on the inlet end.



Install the assembled meter loop after removing plugged tailpiece from the riser. (Use the plugged tailpiece for your next job.)

**GAS SERVICE PRODUCTS DIVISION**
**ECLIPSE FUEL ENGINEERING COMPANY**
**1109 Buchanan St., Rockford, Illinois**
Export: Ad. Auriema, Inc., 85 Broad Street, New York 4, N.Y.

**Village of Montgomery,** Louisiana, (a new company), plans to build distribution systems in Clarence and Montgomery, La., at an estimated cost of $207,000. United Gas Pipe Line Co. of Shreveport is the supplier. The project, recently approved by the FPC, includes a 15-mile 3-in. supply lateral and the distribution systems. The distribution systems will include 82,000 ft of 3-in., 40,000 ft of 2-in., and 40,000 ft of 1½-in. mains and 40,000 ft of ¾-in. service lines. Contractor is Acy Pipeline Constructors, Inc. of Baton Rouge. Associated Consulting Engineers of Alexandria, La. are engineers on the project.

**The Gas Service Company,** Kansas City, Missouri, has won four natural gas franchises in Karney, Mo., a town of 700 persons located about 8 miles north of Liberty, Mo., on State Highway 92, and in Odessa, Grain Valley, and Oak Grove, Mo., in the Lee's Summitt division. The distribution system in Karney will include 24,341 ft of 6-in., 3897 ft of 4-in. and 14,621 ft of 2-in. mains, and will be built at a cost of approximately $100,000; a potential of 300 meters is anticipated for the city.

Present plans for the three distribution systems in Lee's Summitt include installation of 5290 ft of 6-in., 2620 ft of 4-in. and 8470 ft of 2-in. for the distribution system in Grain Valley. In Odessa, the system will require 2510 ft of 8-in., 12,480 ft of 6-in., 13,510 ft of 4-in., 5440 ft of 3-in. and 29,750 ft of 2-in. In Oak Grove, Gas Service plans to lay 8980 ft of 6-in., 13,335 ft of 4-in., 2690 ft of 3-in. and 13,320 ft of 2-in.

Company also plans to install 6 new distribution systems in two states and add more than 2200 customers to the company's system, as soon as certificates of public convenience and necessity are secured from the respective state regulatory commissions. Largest of the incoming cities is Savannah, Mo., where approximately 118,800 ft of pipe will be laid to accommodate the city at an expenditure of $457,000. Other towns are Buckner, Mo., located on U. S. Highway 24 about 20 miles east of Kansas City where an estimated 450 gas meters will be served initially. About 280 meters will be installed. In Nixa, Mo., a town of 944 residents, located 12 miles south of Springfield, Mo., a distribution system to serve 280 meters is anticipated. In Arma, Kansas, a town of 1300 located 5 miles north of Pittsburg on U. S. Highway 69, will add approximately 530 gas meters. Alden, Kansas, located about 20 miles northwest of Hutchinson, will bring about 100 gas meters onto the Beloit division lines. The town is the site of the newest and second largest underground storage field for natural gas recently opened by Cities Service Gas Co. In Gas Service's Mission division, the community of Stilwell, Kansas, has petitioned for natural gas service. Located south of Stanley about 7 miles on U. S. Highway 69, Stilwell will add another 83 meters to company's system.

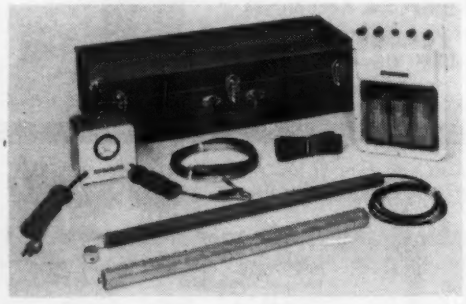
**Rocky Mountain Natural Gas Company,** Inc., Denver, Colorado, has construction underway on distribution systems in towns of Aspen, Carbondale, Basalt and Glenwood Springs and plans to complete all work by the first part of November. Construction part of a transmission line extending from the company's gathering system in the vicinity of Collbran, Colorado, to Carbondale, Colorado on the Roaring Fork River and then up and down the valley to Glenwood Springs and Aspen. Project includes approximately 70 miles of 6⅝-in. OD gathering and transmission line, and approximately 60 miles of distribution lines ranging from 2 through 6-in. Approximately $2,000,000 has been budgeted for this work. Contractor is H. C. Price Co.

*New High-Performance*

**"LITTLE JEEPER"**

**HOLIDAY DETECTOR**

***Weighs Only 9 POUNDS Including Battery***



Little Jeeper Detector Kit includes: **Battery Charger,** 110 v. 4-amp. with ammeter & circuit breaker • **Ground Cable,** 30 ft., 6-ft. rubber sleeve protects operator • **Battery,** spillproof, rechargeable • **Electrode Connector & Handle** • **Spring Electrode** • **Weatherproof Shipping Case.**

For accurate check of all standard coating specifications. Pulse-type generator circuit. Improved design spring electrode rolls easier; choice of size. Adjustable output 2,000 to 16,000 volts. Three signals—spark, light, buzzer. Housing sealed against dust, moisture. **WRITE FOR COMPLETE INFORMATION.**

Spy Detector

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**Pipeline INSPECTION CO., Inc.** Day or Night Phone BA 1-6036

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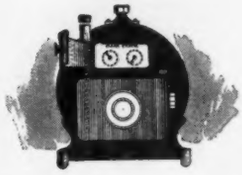
We are as near as your telephone.



In 1836, American Meter Company manufactured its first Wet Test Meter. In 1844, it introduced the Tincase Meter.

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the Ironcase Meter. American brought out the world's first practical

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***Today, after these years of leadership in Gas Measurement, American Meter Company looks forward to the even greater challenges of the future.***

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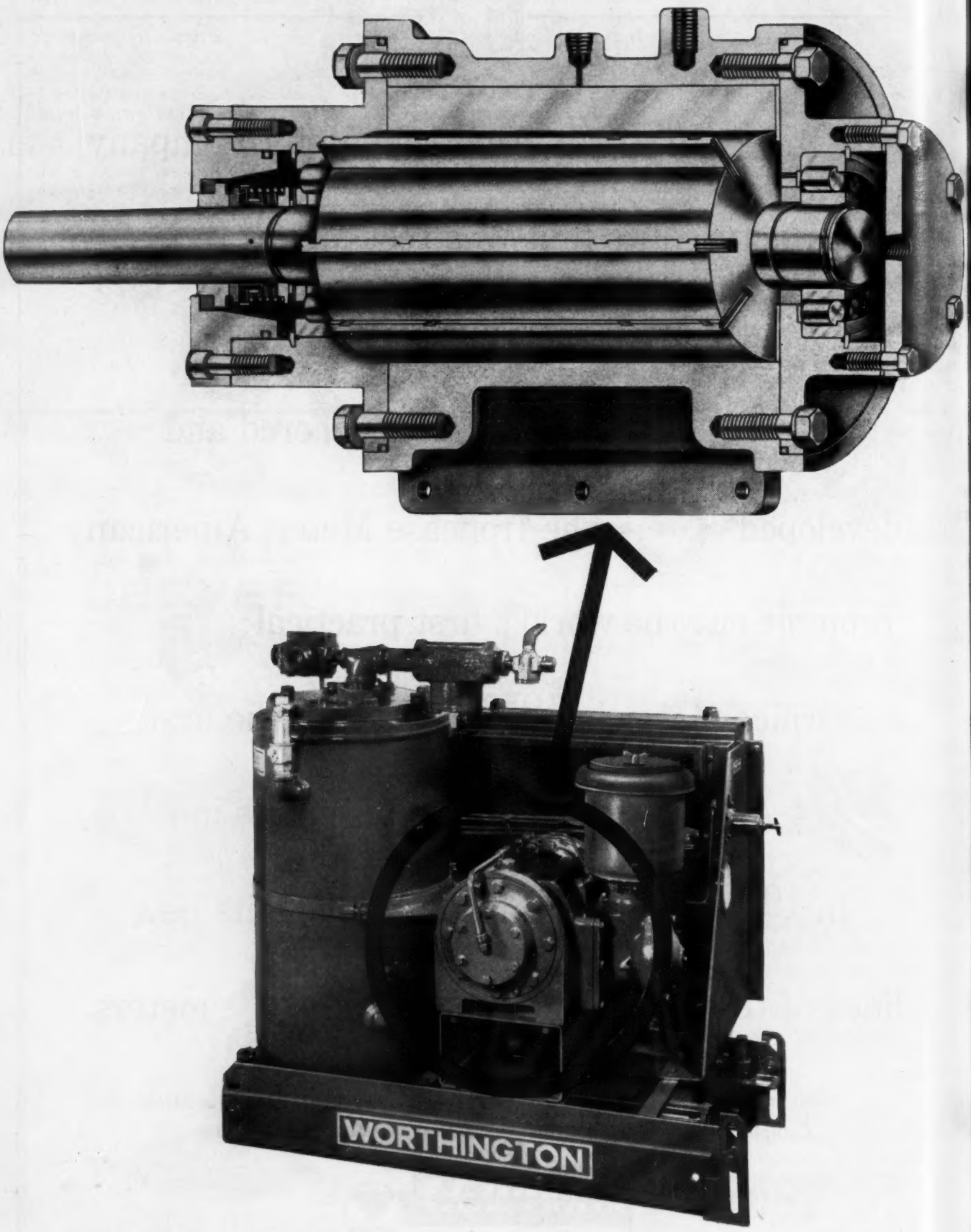


At top, section of New Worthington Mono-Rotor Rotary Compressor. Construction features simplicity and accessibility. Above is the packaged Mono-Rotor unit — ready to mount. It is the most compact, lightest unit available today.

# NEW MONO-ROTOR PTO COMPRESSOR SO DEPENDABLE WARRANTY EXTENDED TO FULL YEAR...

he new Worthington Mono-Rotor ompressor has gained extensive eld experience in both the utility nd construction industries with outanding success. Performance has een so successful, in fact, that Vorthington has just lengthened its arranty period from 3 months to ne year. It is the first major manucturer supplying compressors to e utility industry to do so.

The new Mono-Rotor compressor as many other advantages for utilies in addition to its extreme ependability. For example, Worthgton design refinements over the st 5 years has produced for utilities e packaged unit shown at left. It is e lightest weight, most compact ompressor unit available today—om 100 pounds to 800 pounds lighter than comparable units. It saves weight and provides additional space in the truck for tools, equipment and supplies.

The Mono-Rotor is equipped with the simplest, most complete and dependable controls available today. To operate, simply engage the P.T.O. and the automatic controls do the rest for as long as you want.

Do you prefer a belt-driven P.T.O. unit or a direct-driven unit? Worthington builds the Mono-Rotor for economic installation in either case. The package unit installs quickly, with a minimum space and minimum labor requirement. But the Mono-Rotor is available in separate components for tailoring to any truck unit you prefer.

What about price? For both 85′ and 125′ models we believe that it will be the most attractive you'll find. And don't forget the added value of the new one year warranty.

But proof of the Mono-Rotor value lies in its performance. Ask about a possible demonstration or trial. To get fast response send the coupon shown here. Worthington Corporation, Holyoke, Mass. In Canada, Worthington (Canada) Ltd., Brantford, Ontario.

WORTHINGTON

PRODUCTS THAT WORK FOR YOUR PROFIT

is is the "Drivers Dream" truck engine conol. It is p eumatically operated and works ectly on the engine carburetor butterfly. o valve b x on carburetor—no governor—o dash bo rd control, just this easily installed cylinder. Piston rod A is the basic control—setting carburetor butterfly for road or compressor operation—automatically. Piston rod B varies engine speed according to air demand during compressor operation.

**WORTHINGTON CORPORATION**
**Section 60-40, Holyoke, Mass.**

____ Please send me information on the packaged 85′ and 125′ Mono-Rotor PTO compressors.

____ I would like information about separate components for "tailoring" to a truck.

____ Please tell me more about the possible demonstration and trial of the Mono-Rotor.

____ Please send me complete information on Worthington Blue Brute air tools for utility work.

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COMPANY_____

CITY_____ STATE_____

NO MIDNIGHT WORRIES FOR THIS GAS MAN...

FISHER
Series 29
RELIEF VALVE

and intermediate

## Prevents hazardous conditions in low pressure systems

Don't gamble with the safety of your system! Put a Fisher Series 29 Relief Valve on the downstream line to make *sure* that excess pressure is released in case of emergency. Free-Flo design of the Series 29 will relieve at maximum gas flow without building up pressure in the downstream system.

Throttling action permits the Series 29 to relieve *only* the excess gas required, then shuts off tight, automatically, without leaking. System will not fall below normal pressure. Valve opens and closes on a range of approximately 4" W.C.

One rapid adjustment changes relief setting. Valve can be tested without over-pressuring system. Available in 4", 6", or 8", 125 lb. ASA flange bodies.

For low pressure distribution systems, the Type 29 has proven itself in thousands of installations. For higher pressures, Fisher now has available the Type 29H, designed for intermediate gas distribution systems. The Type 29H handles relief settings up to 50 psi.

### PRESSURE RANGES

Series 29 is available with exact relieving pressure within the following ranges. May be adjusted in the field.

| TYPE | SPRING DWG. NO. | ADJUSTABLE RANGE | PRESSURE CHANGE TO STROKE MAIN VALVE WIDE-OPEN |
|---|---|---|---|
| 29 | 1B5370 | 11" w.c. to 28" w.c. | 4" w.c. |
| | 1B5371 | 1 to 2½ psi | 0.2 psi |
| | 1B5372 | 2¼ to 4½ psi | 0.3 psi |
| | 1B5373 | 4½ to 7 psi | 0.5 psi |
| 29H | 1D8923 | 5 to 15 psi | 0.5 psi |
| | 1D6659 | 15 to 35 psi | 1.4 psi |
| | 1D7455 | 20 to 50 psi | 2.0 psi |

### PRESSURE LIMITATIONS

| VALVE BODY SIZE | TYPE 29 MIN. RELIEF SETTING | TYPE 29 MAX. RELIEF SETTING | TYPE 29H MIN. RELIEF SETTING | TYPE 29H MAX. RELIEF SETTING |
|---|---|---|---|---|
| 3" | .... | .... | 5 psi | 50 psi |
| 4" | 11" w.c. | 18 psi | 5 psi | 40 psi |
| 6" | 11" w.c. | 10 psi | AVAILABLE ON | |
| 8" | 11" w.c. | 5 psi | REQUEST | |

WRITE TODAY FOR BULLETIN P29B

IF IT FLOWS THROUGH PIPE ANYWHERE IN THE WORLD . . . CHANCES ARE IT'S CONTROLLED BY . . .

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*Marshalltown, Iowa / Woodstock, Ontario / Rochester, England*

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FISHER®

SINCE 1880

## Distribution Developments

**Nashville Gas Company,** Nashville, Tennessee, has construction projects for 1961 that total $206,378. All work is being done by company crews in Nashville and surrounding areas. Included in the projects is installation of 796 ft of 4-in. standard pressure cast iron pipe on Lynwood Park Drive at a cost of $2348. Underway, or soon to be completed, is installation of 1125 ft of 4-in. high pressure welded steel line on South Fifth Street at an estimated cost of $3488; a $1575 project on Craig Meade subdivision calls for laying 990 ft of 2-in. HP line; a $40,000 project in Shelby Park involves installing 2000 ft of 6-in. HP line and a bridge crossing. In the Fortland Subdivision, 6916 ft of 2-in. HP line was installed at a cost of $8880, and 1114 ft of 4-in. HP at a cost of $1908. On Bryan Street, 1070 ft of 2-in. HP line was installed at a cost of $2134; on Hill Road, 1015 ft of 2-in. HP line was installed at a cost of $1888.

Other projects recently completed were 2064 ft of 2-in. HP line in Bakwood Heights at a cost of $3438; 2285 ft of 2-in. HP line in Kenilworth Estates for $3209; 1464 ft of 4-in. HP line on 28th Avenue N. for $4229; 1855 ft of 2-in. HP line in Geneva Circle for $3263; 4484 ft of 4-in. HP line in Hillsboro Road for $12,020; 4889 ft of 4-in. HP line in Seven Hills subdivision for $8451; 5135 ft of 4-in. intermediate pressure line along Charlotte Pike for $14,711; 1676 ft of 2-in. line on Ewing Lane at a cost of $3763; 995 ft of 2-in. line along Old Hickory Boulevard at a cost of $1701; 844 ft of 2-in. along Sperry Avenue for $1539 and 600 ft of 4-in. line along Franklin Road for $1638. In Brentwood, approximately 8775 ft of 2-in. and 14,473 ft of 4-in. HP line was installed at a cost of $57,000. Installation of new services on the Nashville system involve 25,300 ft of 1-in. steel line and will cost $29,095.

**Minnesota Valley Natural Gas Company,** St. Peter, Minnesota, has work underway on installation of mains and services, odorizers, meter assemblies and domestic, industrial, and commercial intermediate pressure systems in the northwestern part of Minnesota. The project, scheduled to be completed October 1 by contractor crews of Engineering Construction Co. of Tulsa, involves installation of approximately 1,200,000 ft of 1 through 8-in. lines.

**Lake Superior District Power Company,** Ashland, Wisconsin, has received a franchise from the Ashland common council to distribute natural gas in that city when it becomes available. Northern Natural Gas Company would be the supplier. Lake Superior also has franchises at Phillips and Park Falls.

**Pacific Gas & Electric Company,** San Francisco, California, will convert to natural gas the propane-air gas system at Redding, California as soon as the new Alberta-California pipeline, currently under construction is completed and natural gas is available. PG&E construction plans include a 40-mile supply lateral from the main transmission line that will run 11 miles west to Cottonwood, north to Redding, and on to a terminus near Shasta Lake at the Calaveras Cement Co. plant that will be served natural gas. Initially, Redding customers will receive natural gas service; future plans include extension of service to Cottonwood, Anderson, Enterprise, Project City, Central Valley, and adjoining suburban areas.

OUT-BEVELS A BEAVER

Throughout history, Nature's most effective beveling machine was a furry little animal called the beaver. Unfortunately for him, through the years jobs came up that were beyond his power (beavers have proved highly ineffective on steel pipe). Today, the beaver has been retired to the forest because H & M now covers the beveling market. There are seven standard H & M models, designed to cut and bevel any size pipe from 1½ inches through 36 inches. H & M's Out-of-Round attachment, which fits all H & M machines, makes it possible to cut irregular shaped pipe accurately and has eliminated costly, inaccurate cuts. The H & M Shape Cutter fabricates tees, els, saddles and other irregular shapes quickly and accurately. The H & M "BEVEL-LAND" Grinder smooths and cleans pipe cuts and bevels in a matter of seconds. Retire **your** beaver to the forest — not only does the H & M line do the finest job possible, but it doesn't have to be fed (another saving passed on to you).

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## Vermeer Model W-3

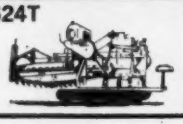
# POW-R-DITCHER

***FAST! RUGGED! HYDRAULIC!***

**Digs 3" to 12" Widths**

**Equipped with 18 hp. engine,** the rugged Model W-3 POW-R-DITCHER is ideal for contractors, municipalities, utilities and custom operators. Rubber-tired wheels or crawler tracks. Hydraulic drive system — no shifting. 2-way dirt conveyor. Ask for a demonstration.

**PICK THE POW-R-DITCHER TO FIT YOUR NEEDS**

524T 

4T

W-1

3P

Please send me FREE information and prices on the complete Vermeer line of self-propelled POW-R-DITCHERS.

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☐ Also include information on new Vermeer hydraulic back filler.

**VERMEER MANUFACTURING COMPANY**

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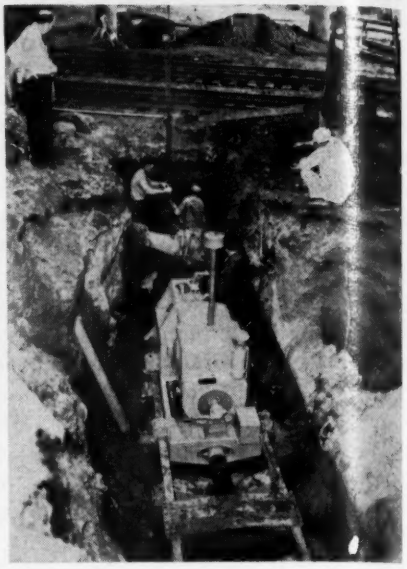

Big bore. New 20-in. distribution main for Milwaukee Gas Light Company goes under a busy railroad where Hawley Road viaduct crosses State Street in Milwaukee. L-B Contractors augered a 35-ft, 24-in. tunnel under the tracks for the 20-in. main.

**Northern States Power Company,** Minneapolis, Minnesota, plans to spend about $10,300,000 for expansion of its natural gas service system. This includes its Wisconsin system. Public Service Commission has authorized NSP (Wisc.) to spend $110,810 for construction of a service center at Chippewa Falls.

**Extra Heavy All-Malleable COUPLING**

Engineered for latest distribution pressures and for installation ease. Inspect its construction and quality materials in detail.

**Provides More Deflection Than Ever**

**Top Quality for 22 Years in Gas Distribution Equipment**

Get helpful CATALOG 29. Photos, specs, detail drawings & much helpful data for modernizing or new installations.

**PERMANENCY** Rely on NORTON-McMURRAY for the finest! NORMAC continues to modernize and improve couplings and fittings in step with latest gas distribution demands. 22 years experience concentrated on ONE purpose . . . the BEST! Today, major gas distribution companies say "NORMAC" to define their standard of quality.

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***New* HIGH.....POWER**
**.....TORQUE**

**Air MOTORS**

. . . ample power to rip through tough roots and earth formations . . . full speed and torque right up to stalling point . . . safer to operate than engine or electric drives.

FASTER Pipe Installation — LESS WASTED TIME

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CAST IRON

Just as the druggist's symbol—mortar and pestle—instills confidence in a buyer so, too, does this trademark—U. S. Pipe. Specify U. S. Pipe for your cast iron gas mains and you can be sure of quality. Quality born of rigid manufacturing control from mine to finished product. Every length of U. S. Pipe undergoes exacting quality tests . . . for strength and uniformity . . . before it goes out to you. Cast iron pipe quality is attested by the fact that today throughout the nation the cast iron gas mains of 55 major utilities are still serving after a century of profitable operation. Service, long life and integrity are built into U. S. Pipe.

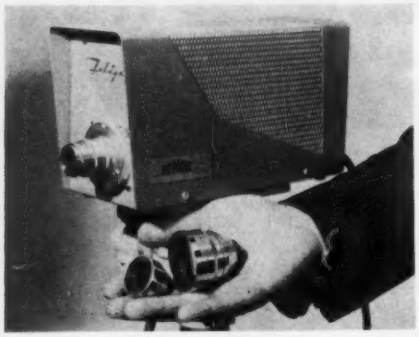
• Standardized mechanical joints are bottle-tight for usual gas distribution pressures . . . and for all types of gas • Centrifugally cast pipe is tough, uniform, strong • Joint design allows for deflection during and after installation • Service connections are easily made • Long life is a matter of record

U. S. PIPE & FOUNDRY COMPANY
General Office, Birmingham 2, Alabama

A WHOLLY INTEGRATED PRODUCER FROM MINES AND BLAST FURNACES TO FINISHED PIPE

# Product Parade

MATERIALS • EQUIPMENT • SERVICES



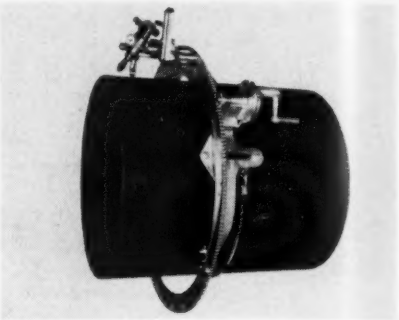
**High definition television camera** for home and business attaches directly to standard TV receivers or monitor. A completely new miniature closed-circuit television announced by Du Mont Div. of Fairchild Camera and Instrument Corp., brings clear, brilliant TV pictures for use in the home or for thousands of industrial and business applications at total cost near that of home movie equipment. Called the *Tel-Eye,* the new camera uses existing TV receivers as monitors, and its almost completely transistorized circuitry provides high definition pictures with extremely good contrast characteristics. Camera is self-contained with a regular power cord for attachment to an a-c outlet and a coaxial connector for attachment to the TV receiver. **1**

**Newest member** of the International construction equipment family is a crawler tractor in the 105 hp range that features 6-cylinder diesel engine, 6-speed full reverse transmission, dry-type air cleaner and track rollers with 1000-hr lubrication intervals. Has forward speeds ranging from 1.5 to 5.9 miles an hour and reverse from 1.9 to 7.3 mph. Drawbar hp is 85 with the unit having a 23,750 lb max. drawbar pull with adequate weight and traction. **2**

**Digital logging.** Technique employed by Bristol's data-master digital logger to present in digital form the measurement of a physical variable such as flow, pressure, etc. is discussed in new product data bulletin. Block diagrams are used to demonstrate how a physical property is measured, converted to an electrical input, and delivered in digital form. **3**

**Entire industrial air compressor line** . . . both Westinghouse unit type and Le Roi stationary units . . . are discussed in new illustrated bulletin available from Le Roi Div. Unit type compressors from ½ to 15-hp for displacements up to 70 cfm are described together with stationary models from 25 to 100 hp for industrial air supply. Stationary compressors with ratings of 25, 50, 75, and 100 hp supply air at 125 psi in one and two-stage compression cycles. **4**

**Tubing benders.** Six sizes of tubing benders recommended for use with soft or hard copper, aluminum, and certain sizes of stainless steel tubing, as well as brass tubing are available from Ridge Tool Co. Six benders will accommodate tubing of $\frac{3}{16}$, ¼, $\frac{5}{16}$, ⅜, $\frac{7}{16}$, and ½-in. O.D. respectively. Forming shoes and rolls for each size are made of high-grade steel to prevent marring and deformation during bending operations. **5**



**Pipe cutting and beveling machines** available from Crose-Perrault Equipment Corp. feature a new compact design that allows coated pipe to be cut and beveled with much less cutback. A full circle traveling ring cuts and bevels pipe simultaneously to assure accuracy. Ring eliminates jerky movement and insures a cut so smooth that buffing costs are negligible. Easy to install on closed section of pipe. One model handles pipe from 1½ to 4-in. Other models handle pipe from 4 thru 48-in. Field tested, unit is light weight, rigid, and constructed of finest available aluminum alloy. **6**

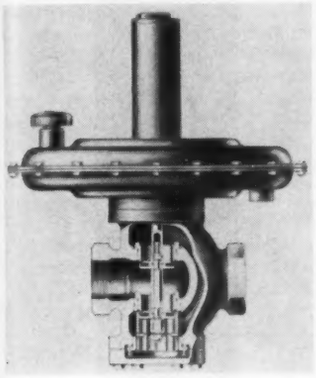
Soft as Moonlight . . .

The mellow glow of Gaslites adds delightful charm and interest to any outdoor setting. For information on the golden-crested Embassy or other distinctive Gaslites by Arkla, write

Gaslites BY ARKLA

ARKLA • GASLITE DIVISION
SHANNON BUILDING • LITTLE ROCK, ARK.

**The many applications** that can be handled by front-end loaders are explained in new booklet by Caterpillar Tractor Co. Entitled "Do More Jobs . . . Easier," the 8-page booklet, covers each of company's 3-wheel-type and 3 track-type Traxcavators. Each machine is shown under working conditions. Pictures of most popular attachments and condensed specifications are also included. **7**

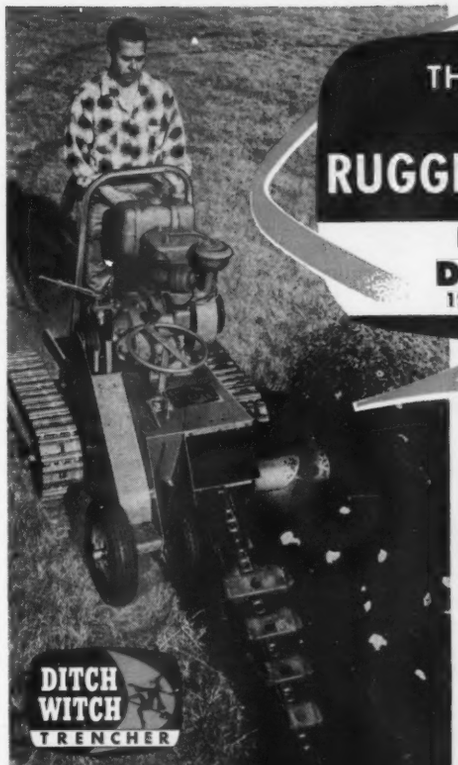


**Zero Governor,** latest addition to Fisher Governor Co.'s 166 series, provides a lower reduced pressure range than had been available previously. Maximum inlet pressure is 20 psi, reduced pressure range is minus 1-in. to plus 1-in. w. c., and plus 1-in. to 4-in. w. c. Available in 1½ and 2-in. sizes in screwed body construction and 2-in. 125 lb ASA flanged body construction. Both body styles are cast iron. **8**

**Built-in ignition noise suppression** for two-way radios has been developed by Motorola and is available in the transistorized Motrac low band (25-50 mc) mobile radio line. This device suppresses ignition noise interference caused from vehicle electrical systems, and consequently extends the operating range of gas utility two-way radio systems and provides more reliable reception in heavy traffic areas. **9**

**Backhoes.** Three completely new Parsons-Shawnee backhoes for utility tractors have been announced by Parsons Co. New models include the 1000, with a digging capacity of 10-ft deep; the 1200 with a 12-ft digging capacity, and the 13-ft 1300. With the recently-announced 15-ft 1500, Parsons-Shawnee line of backhoes now includes four models to cover a complete range of sizes to handle a variety of digging jobs. Backhoes feature "Hydaway" hydraulics with cylinders, pistons and hoses enclosed and protected; 3-position dig-all bucket; non-skid stabilizers; safety locks on both boom and swing and multiple series control, and full 180 deg swing. **10**

**American standards** . . . now numbering 1973 . . . are listed in the new 1961 catalog available without charge from American Standards Association. Booklet contains a listing of special publications in standardization field as well as pamphlets and standards recommendations of the International Organization for Standardization. Standards are indexed by title and also listed according to various phases of application such as civil engineering and construction, mechanical engineering, automotive, materials handling, office equipment and supplies, drawings, symbols and abbreviations, etc. **11**

THE TRENCHER WITH
RUGGED SIMPLICITY!
NEW CRAWLER
DITCH WITCH
12 HP MODEL M4-22CR

Out-Digs
Out-Economizes
Out-Performs

ANY MACHINE IN ITS DIGGING RANGE!

Trench to 12" wide, to 5' deep. Digs in any kind of soil.

No sport car style . . . *looks* rugged because it's *built* rugged, heavier materials, heavy-duty parts, more work-weight, extra traction and flotation . . . to dig in hard or soft soil . . . offers simple operation, easy steering, high maneuverability!

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Choice of 9 or 12 HP track models; 7, 9, 12 or 30 HP on rubber tires.

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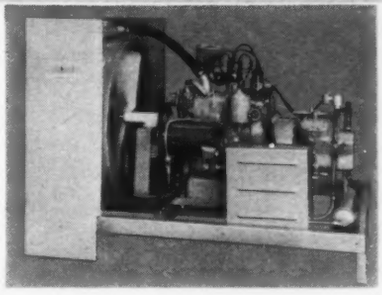
PERRY, OKLAHOMA

gascool announces the
FIRST AGA APPROVAL
For Gas Engine Driven Air Conditioning Systems

AGA approval granted on 5 ton model . . .



The thorough testing undergone by the gascool unit to merit the AGA approval has pointed out the dependability of the unit. gascool's cranking mechanism, carburetion system, ignition system, and control circuits, as well as the overall construction was thoroughly checked and proven. These important features are on all gascool models.

gascool exceeds industry standards for quality, cooling, and dependability. And gascool is economical too — giving a savings of up to 61% in operating costs.

gascool's complete line includes models in 3 ton to 15 ton capacities with built in air cooled condensers, water cooled condensers, or remote type air cooled condensers; and roof mounted models with heating and cooling combination or cooling only in 5 to 10 ton capacities.

These features, plus others, make gascool the best buy.

QUALITY ECONOMY DEPENDABILITY
*All are found in a gascool Gas Powered Air Conditioning System*

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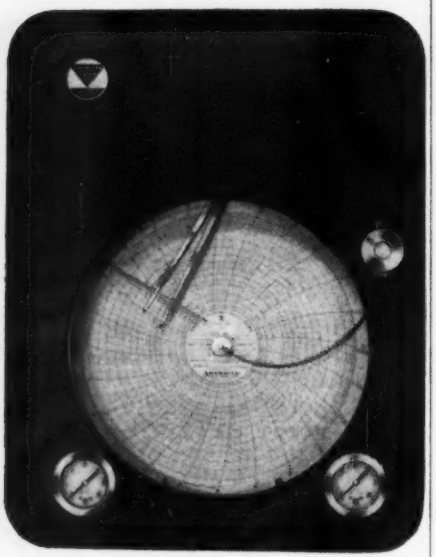
*Division of Aero-Test Equipment Co., Inc.*

# SERIES A-88 CONTROLLERS



Designed to give rugged, dependable performance, American® Series A-88 Controllers provide versatile, positive control of... Flow, Pressure, Liquid Level and other continuous process variables...accurately and automatically.

- Rugged, null-type, non-bleed Relay.
- Simple, in-the-field linkage adjustment.
- Maximum Proportional Band changes with minimum output pressure changes.
- Proportional Band easily widened without disconnecting instrument tubing.
- Spring-closing Reset Valve sealed with bellows and calibrated according to time.

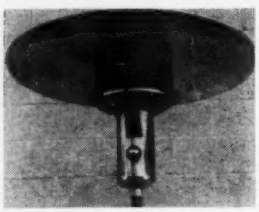
Ask for Bulletin 406.

AMERICAN METER COMPANY

Sales Offices in Principal Cities


## PRODUCT PARADE

**Latest addition** to Security Valve Co.'s line of automatic shutoff valves is a new line, known as IP-L/Temp, that provides dual automatic safety by closing on either increasing pressure and ambient temperature, or both. Applicable in gas distribution operations, valves incorporate a diaphragm that senses line pressure and programs the valve into "Close" position whenever the line pressure exceeds a predetermined level. In addition, a fusible plug with a pre-determined temperature setting is also activated whenever the ambient thermal point is reached. Thus, the dual-safety feature is provided for both conditions of over pressure or dangerous temperature. Valves are available in ASA pressure ratings from 150 to 2500 lb. Normal range of connections are available and include screw, flange, or weld in sizes from ½-in. thru 12-in. **12**



**Gas-fired infra-red radiant heater** for outdoor installation on pool decks, in patios and gardens is now available from the Solarflo Co., Inc. Installation may be permanent, such as a gas light, or on portable base for either natural or propane gas. A stainless steel ceramic-coated heat exchanger at temperatures up to 1600 F provides radiant heat comfort for an outdoor area up to 20 ft in diameter, while emitting an attractive bright orange glow at night. Input is 50,000 Btu per hr. Unit has manual control with 100% safety pilot. **13**

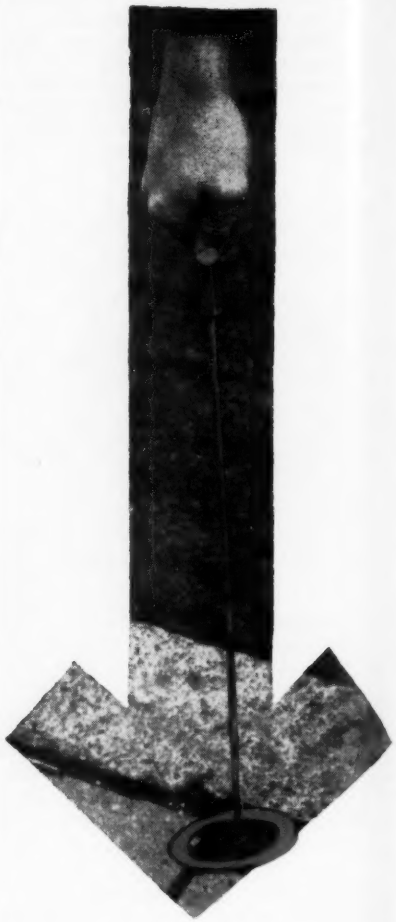
**Two-stage compressors** for oil-free, 100 lb air are now available from Roots-Connersville Blower, a division of Dresser Industries, Inc. New units will deliver up to 3000 cfm oil-free air at 100 psig for processing, oxidation, test facilities, and other applications requiring high purity air. New machine consists of 2 spiraxial compressors driven in tandem by a standard 3600 rpm motor or turbine. They use the same operating principle proved dependable in spiraxial compressors used over long periods of continuous industrial service. Two intermeshing screw-type rotors provide efficient axial-flow compression in each compressor stage. There are no vanes, valves, pistons, or rings to wear or present maintenance problems. Available in 7 sizes from 900 cfm to 3000 cfm. **14**


**HELP WANTED**

Need five first class combination fitters and gas appliance servicemen. High school graduates ages 25 to 40. Minimum of six years of servicing experience on all types of gas appliances and air conditioning equipment. Hourly rate $3.10 plus liberal fringes if you qualify. *Telephone collect* to Frank Keller or John Bolender.

**NORTH SHORE GAS CO.**
Waukegan, Ill.





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## PRODUCT PARADE

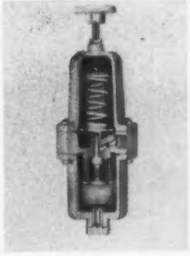
**New sealed flame overhead gas unit heater**, being marketed by John J. Nesbitt, Inc., combines a uniformity of room temperature with complete safety of operation. Especially suitable for use in stores, supermarkets, showrooms, small buildings, relay stations and other areas where a negative pressure is created by standard exhaust fans. No open flame is exposed to the room. By means of a sealed combustion system, spilling of combustion products into the heated space is prevented regardless of conditions inside or outside the building. All combustion air is drawn from outside the building through separate inlet pipes. All exhaust gases and products of combustion are vented to the outside under pressure through a separate pipe. Heater is available in two models, the Radial-Flo unit that distributes complete circle of warm air downward and outward to the floor, and the Down/Blo model that forces heated air directly downward. Two sizes are available with inputs of 115,000 Btu per hr and 85,000 Btu per hr. **15**

**Low pressure regulators** for domestic appliances and commercial and industrial applications such as batch ovens and furnaces are described in 4-page bulletin issued by American Meter Co. Dimensions, pressure spring recommendations, and capacities are given in tabular form for both weight-loaded and spring-loaded models. **16**

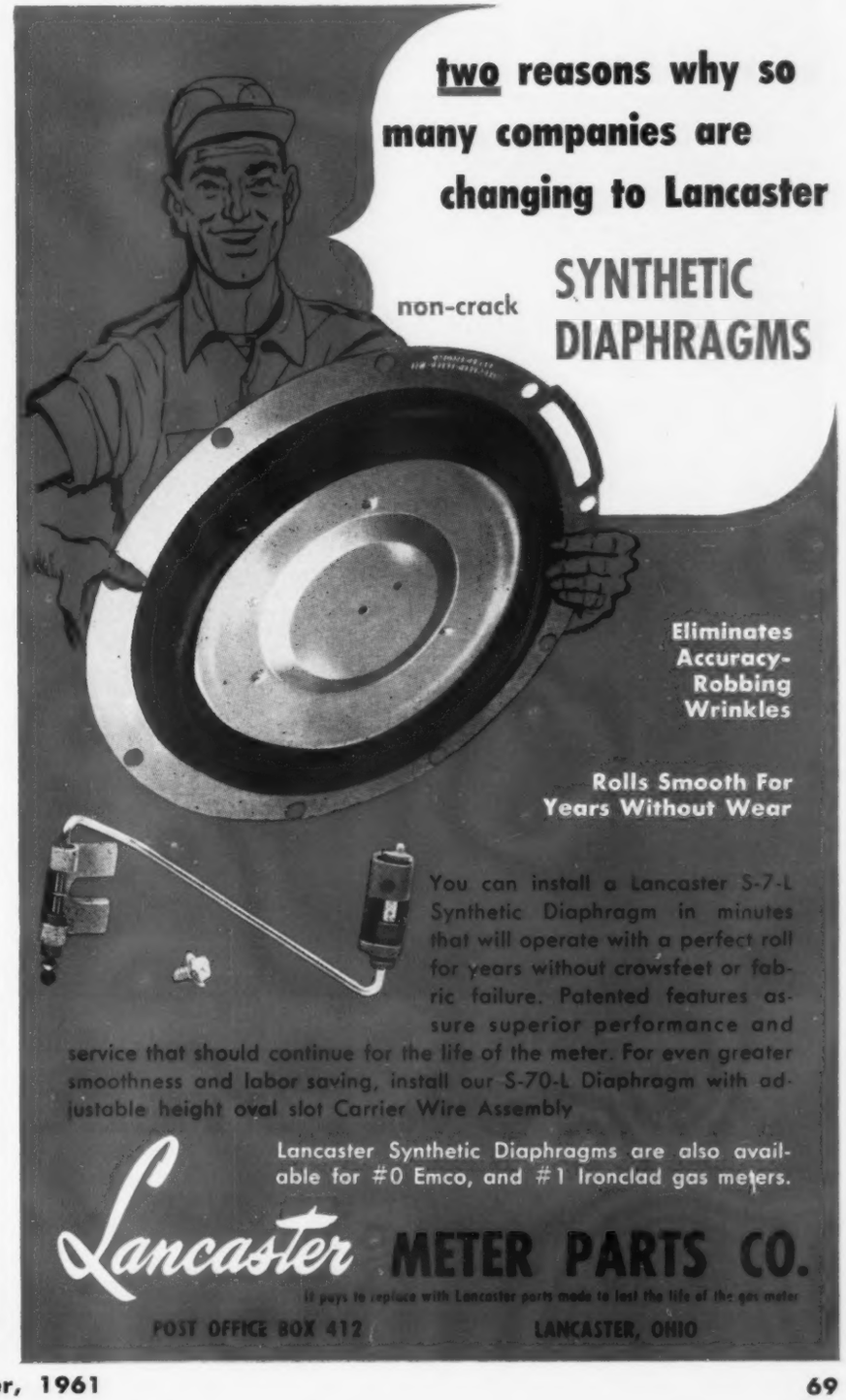
**New 8-channel radio telephone** for Citizens Band has a 5 watt transmitter receiver. Precision engineered hi-gain, all-tube superheterodyne receiver provides up to 3 crystal controlled spot frequencies for Channels 1 to 22. Unit also features a 4-in. dynamic speaker, front panel controls, press-to-talk microphone. Weighs only 15 lb, stands 6⅛ in. high. Power supply is 115 volt a-c and or 12 volt d-c. **17**

**IBM "SURE" program** . . . a new computer technique for customer billing . . . is said to reduce computer installation costs for utilities. SURE, brief for Symbolic Utilities Revenue Environment is a computer program that can be tailored by individual companies to meet their billing requirements; it is applicable to both gas and electric utility accounting procedures. Written for the IBM 7070 data processing system, SURE also can be used with the 7074. Similar programs also are being written for IBM 1401 and 1410 data processing systems for utilities with smaller billing volumes. SURE contains approximately 40,000 computer instructions. Brooklyn Union Gas Co., which will install an IBM 7074 late in 1961, is one of the firms that have begun to put SURE into operation. Brooklyn Union expects the 7074 to be handling its entire customer billing procedure — for more than 1,200,000 meters — by mid-1962. **18**

**New filter-regulator** . . . with one-piece pressure-reducing and relief innervalve . . . has high capacity-to-drop ratio and tight dead-end shut-off. Recently introduced by Kieley & Mueller, Inc., the new regulator uses extremely sensitive diaphragm - spring combination to provide a high capacity-to-drop ratio. At 100 psig inlet pressure and 20 psig outlet pressure, its capacity is 14.75 scfm with only a 1 psi drop. Regulator can be used at inlet pressures up to 150 psig and is available in 4 controlled-pressure ranges from 0 to 125 psig. **19**



**New line of diaphragm pressure switches** from Barksdale Valves features improved accuracy, reduced cost, and higher proof pressure. Accuracy of 0.5% as compared to customary 1.0% is guaranteed for new switches. Employment of erector set technique — a standard body to which interchangeable components such as contact elements, capsules, terminal block housings, explosion proof housings, etc., may be attached — permits use of cost cutting mass-production methods and allows wide choice in specifications that approximate a custom-made switch. Proof pressures to 600 psi and adjustable ranges from vacuum to 400 psi are available. Higher ranges make it possible to use inexpensive diaphragm pressure switches on installations that presently require high priced bourdon tube models. **20**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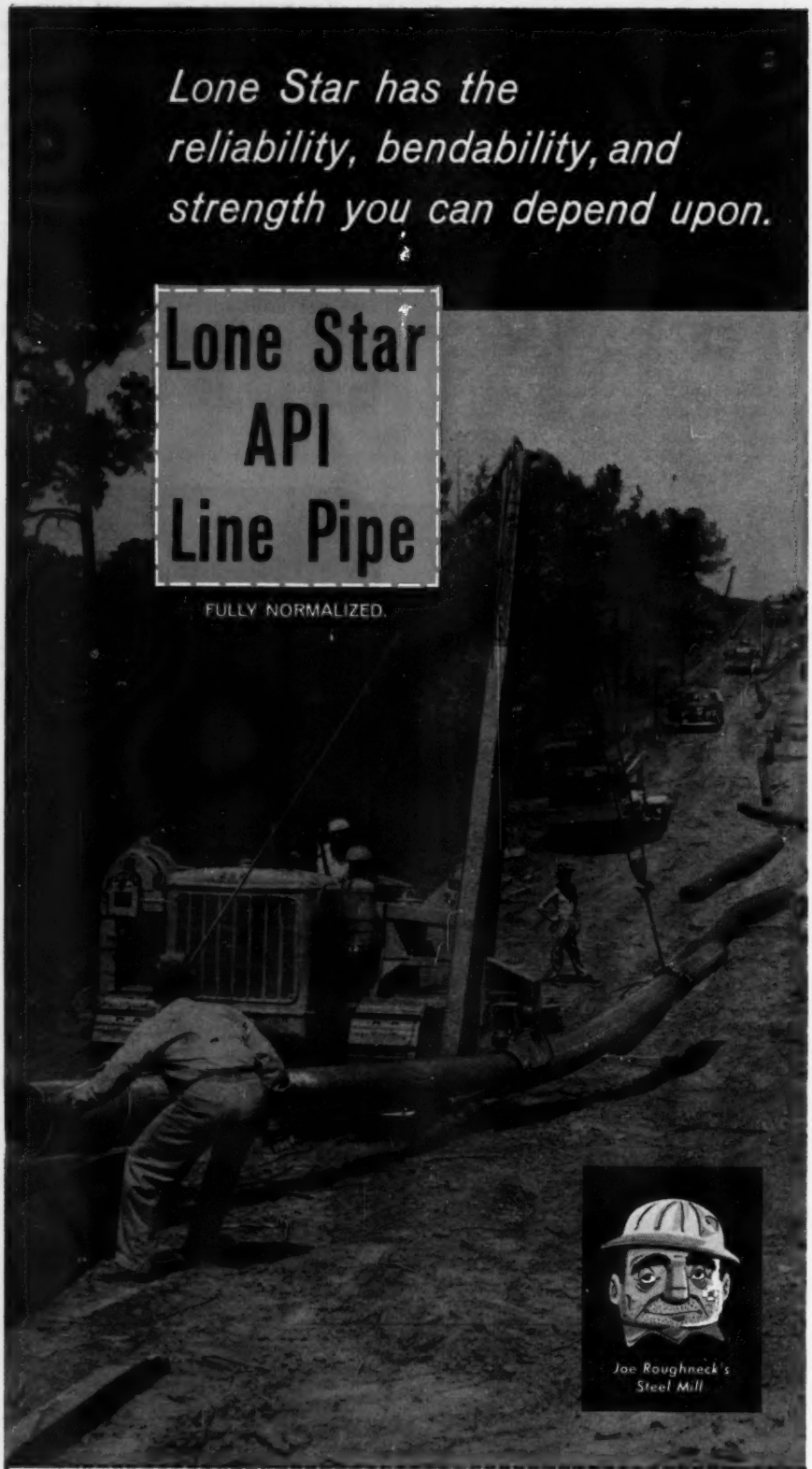
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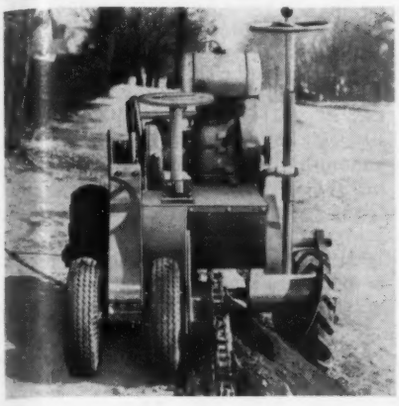
## PRODUCT PARADE



**Jack-leg Ditch Witch trencher** is now available in 9- and 12-hp sizes mounted on rubber tires. Developed for use in installing line where it is necessary to trench close to the curb. Jack on trencher wheel can be installed on either side of machine, allowing spoil to be deposited either on street or parking side of trench. One wheel may be lowered as much as 12-in. so machine can be maintained on vertical plane while wheels are driving on 2 different levels. Will dig trench from 3 to 8 in. wide to depths of 4 ft; or 12 hp model will dig 3 to 12-in. widths to 5 ft depth. **21**

**New dry chemical extinguishing agent,** effective on Class A, B, and C fires is now available from Ansul Chemical Co. The first multi-purpose dry chemical to be offeredin complete line of hand portable extinguishers, "Foray" is available in both cartridge operated extinguishers and stored pressure extinguishers. **22**

**All purpose Epi-Seal Kit** handles gas repairs quickly and economically, enables servicemen to handle wider range of repairs under conditions that require high-rigidity strength. Repair kit also assures positive sealing where flexibility occurs — even under pressures up to 500 psi. Kit contains more than enough epoxy resin plus two separate clearly marked activators for rigid or flexible application. Is recommended for repairing holes, splits, breaks, cracks and leaks on bell and spigot joints, flanges, welds, threads, plugs, couplings, valves service cocks, ells, tees and fittings in cast iron and steel pipe as well as copper or aluminum tubing. **23**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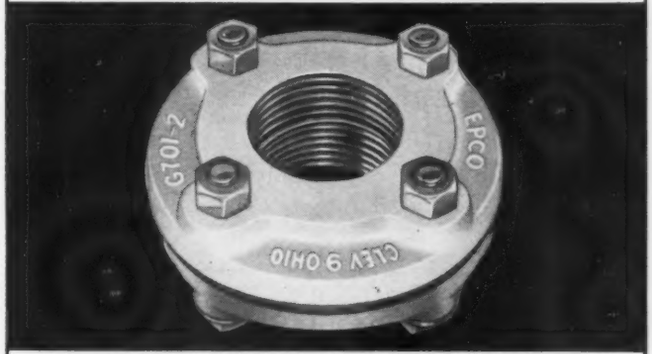


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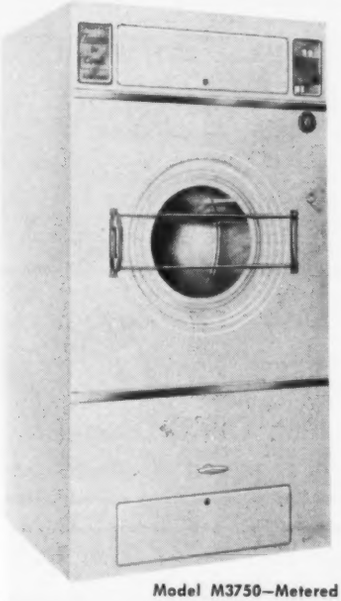

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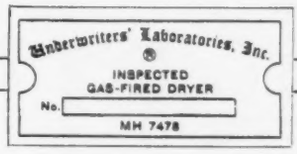


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## PRODUCT PARADE

**Reznor Manufacturing Co.** has increased capacities of its "K series" cabinet blowers, permitting their use in higher-capacity heating and cooling systems and the use of longer duct runs in systems incorporating the blowers. One model utilizes a single blower, is available in capacities of from 2000 to 9000 cfm; previously, it had a peak capacity of 6000 cfm. Another model, with two blowers, now has capacity range of from 4000 cfm to 15,000 cfm. Previous peak capacity of the Model K2 was 12,000 cfm. **24**

**Container for welding electrodes...** "Hotbox" prevents costly welding defects, maintains welding electrodes at factory specified moisture content, and provides positive protection of electrodes from moisture "pick-up" right up to the moment of use. Unit reduces surface and underbead cracking, hidden porosity, surface splatter, and hydrogen embrittlement. Thus new Hotbox unit eliminates many causes of improper welds, excessive cleaning, and weld replacement. Constructed of heavy gage steel plus an extra long life heating element. Available in two sizes for 14 and 18-in. rods. Operates from any 115 volt a-c or d-c outlet in the shop and in the field. **25**

**Maxon Tube-O-Flame gas burner...** designed for mounting on and firing into an immersion tube... is applicable for industrial washing machines or anywhere uniform heat dispersion over entire length of a tube is desired. Available in 3 sizes — 6, 8, and 10-in. — with capacities of 800,000, 1,500,000 and 2,500,000 Btu per hr respectively, these newly-announced units have a turn-down range of 10-to-1. Each unit includes direct-connected motor, blower, built-in air and gas control valves, and flame rod and spark electrode; Installation is possible in much less space than with former types of equipment. **26**

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